IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NORTH CAROLINA
Civil Action No.: 7:23-CV-00897

IN RE:	)
	)
CAMP LEJEUNE WATER LITIGATION	)
	)
This Pleading Relates to:	)
	)
ALL CASES.	)
	)
	)

PLAINTIFFS' LEADERSHIP GROUP'S MEMORANDUM OF LAW IN SUPPORT OF MOTION TO EXCLUDE CERTAIN OPINIONS OF REMY J.-C. HENNET, PH.D.

Pursuant to Federal Rule of Evidence 702 and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 609 U.S. 579 (1993), and for the reasons that follow, the Plaintiffs' Leadership Group ("PLG") respectfully moves the Court to exclude certain opinions of Remy J.-C. Hennet, Ph.D.

I. INTRODUCTION AND RELIEF SOUGHT

This motion seeks an order excluding certain opinions of Remy J.-C. Hennet, Ph.D., a geologist/geochemist/hydrologist and senior principal at S.S. Papadopulos & Associates (SSPA) who was hired by the U.S. Department of Justice (DOJ) to "evaluate the work that had been done by ATSDR." [Ex. 1, Hennet Deposition at 32:2-5; 35:20; 54:6-7]

Although Plaintiffs take issue with all of Dr. Hennet's opinions, Plaintiffs have filed – consistent with the case law – a targeted motion and will employ cross examination to address the remainder of their disagreements. Plaintiffs move to exclude Dr. Hennet's opinions regarding:

- Contaminant volatilization when water buffaloes are filled via the manhole;
- Alleged contaminant losses from disposal of spent spiractor solids, sand filter backwash water and suspended solids;

- "Anomalous" HP-634 contaminant concentration data; and
- "Representative" flow paths and travel time at TT-26.

II. LEGAL STANDARD

Expert testimony is admissible only if the expert is qualified, the testimony is relevant, and the testimony is based on reliable scientific methodology. *Daubert v. Merrell Dow Pharms, Inc.*, 509 U.S. 579, 594-95 (1993); Fed. R. Evid. 702. Factors that guide the reliability analysis may include: (1) whether a theory or technique can be (or has been) tested; (2) whether it has been subjected to peer review and publication; (3) its potential rate of error; (4) whether standards exist to control the technique's operation; and (5) the degree of acceptance of the methodology within the relevant scientific community. *Daubert*, 509 U.S. at 593-94; *Nix v. Chemours Co. FC*, No. 7:17-CV-189-D, 7:17-CV-197-D, 7:17-CV-201-D, 2023 WL 6471690, at *7 (E.D.N.C. Oct. 4, 2023). The objective of the reliability requirement is to "make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field." *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 152 (1999). Responsive and rebuttal experts must demonstrate that they used reliable methodology both in forming their opinions and in critiquing those of Plaintiffs' experts. *In re Ethicon Inc. Pelvic Repair Systems Prod. Liab. Litig.*, MDL No. 2327, 2018 WL 11245148, *3 (S.D. W.Va. July 26, 2018); *see also Funderburk v. South Carolina Elec. & Gas Co.*, 395 F.Supp.3d 695, 716-17 (D.S.C. 2019). As the proponent of Dr. Hennet's testimony, DOJ has the burden of showing it to be reliable. Fed. R. Evid. 702 (requiring proponent to demonstrate "to the court that it is more likely than not" that, *inter alia*, "the testimony is the product of reliable principles and methods").

Another factor that courts consider in the reliability analysis is whether the expert developed his opinions expressly for the purpose of testifying. *Daubert v. Merrell Dow Pharms, Inc*., 43 F.3d 1311, 1317 (9th Cir. 1995) ("One very significant fact to be considered is whether the experts are proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying."); Fed. R. Evid. 702, Advisory Comm. Notes (2000 Amendments); *Kadel v. Folwell*, 620 F.Supp.3d 339, 361 (M.D.N.C. 2022). "An 'expert' opinion is considered unreliable and inadmissible under *Daubert* where ... the expert has developed the opinions expressly for purposes of testifying in the case ....". *Wehling v. Sandoz Pharm. Corp*., 162 F.3d 1158, 1998 WL 546097, at *5 (4th Cir. 1998) (unpublished).

III. BACKGROUND OF DR. HENNET

Dr. Hennet has been working on Camp Lejeune-related matters for the Department of Justice since at least 2005. [Ex. 1, Hennet Deposition, at 25:14-24; 29:8-21] According to the DOJ,[1] all of Dr. Hennet's work related to Camp Lejeune for the past twenty years has been performed for the purpose of and/or in anticipation of litigation. DE-354 at 12-13; Ex. 3, 4/21/25 DOJ Letter, at 3.

Dr. Hennet's testimony has been previously excluded pursuant to Federal Rule of Evidence 702 on the grounds that it "was based on sheer speculation rather than sufficient facts or data and was not the product of reliable principles or methods." *United States v. Dico, Inc., et al*., 265 F.Supp.3d 902, 971 n.33 (S.D. Iowa 2017). Several of Dr. Hennet's opinions in this case suffer from the same deficiencies.

[1] Plaintiffs suspect that Dr. Hennet worked on non-litigation matters too, including advising the Navy on matters including soil and water testing, as well as monitoring well locations, in years prior to and after 2005.

IV. ARGUMENT

A. Dr. Hennet's Opinion regarding Contaminant Volatilization through Water Buffalo Manholes is New (not in his Report), Speculative and Unreliable.

Based on his deposition testimony, it appears that Dr. Hennet plans to offer an opinion regarding the amount of volatilization of the chemicals of concern when water buffaloes are filled via the manhole at the top of the water tank. Dr. Hennet has performed no calculations in support of this opinion; rather, he relies only on his observation of the filling of one water buffalo in February 2025, two months after his expert report was served in December 2024. This opinion should be excluded because it is not in Dr. Hennet's report and it is based on sheer speculation.

Water buffaloes are mobile tanks for the storage and transportation of drinking water for use in areas of the base not served by a water supply. Water buffaloes may be filled with water in more than one way. Prior to 1972, some of the Army Technical Manuals instructed to fill the water buffaloes through a filler pipe, which has a strainer. [Ex. 4, Sabatini Report, Water Buffalo Appendix, at 14][2] Beginning in 1972, the Technical Manuals instructed that the buffaloes should be filled through the manhole opening (after the cover is removed), which does not contain a strainer. *Id*. at 14 & 16-17 (instructions for M107s).[3] Certain models of water buffaloes were not even equipped with a filler hatch and strainer. *Id*. at 9-11 (describing the M149A1, which was manufactured as early as January 1968 and could only be filled through the manhole opening).

The calculations in Dr. Hennet's report only concern the filling of water buffaloes via the filler pipe with strainer, using a formula that comes from a publication regarding volatilization

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[2] The instructions varied. For example, instructions for the WWII-era 250-gallon Tank Trailer included instructions for filling through both the manhole cover and the "bell strainer" (which was used when filling with a hand pump). [Ex. 4, Sabatini Report, Water Buffalo Appendix, at 4 (citing BRIGHAM_USA_0000043040)]

[3] Inventory records from 1968 establish that Camp Lejeune had 84 M107s at that time. [Ex. 4, Sabatini Report, Water Buffalo Appendix, at 19].

losses in showers. [Ex. 2, Hennet Report, at 5-40 – 5-41; Ex. 1, Hennet Deposition at 256:23-257:2] Dr. Hennet emphasized in his report the effect of the strainer on volatilization. *E.g., id*. at 5-40 (hypothesizing that volatilization would occur "through increased contact between water and air due to the forcing of water through a strainer that generates water jets and droplets that greatly increases the surface area of the water/air interface for COC [contaminants of concern] exchange to the tank air."). Dr. Hennet testified that filling through a manhole is analogous to filling a bathtub as opposed to a shower. *Id*. at 265:12-19.

Dr. Hennet observed the filling of a water buffalo via the manhole during his February 2025 Camp Lejeune site visit and then concluded based on his observations (with no calculations) that there would be "substantial loss that is comparable to what I calculated for the strainer. That's basically – I didn't do calculations, but I did for myself an evaluation of that." [Ex. 1, Hennet Deposition at 265:12-266:3; *see also* 121:16-20 ("I just basically thought about what I observed on February 11, especially under filling of the water buffalo that I witnessed. But I didn't write anything or I did not calculate anything."); 260:7-21 (describing the water buffalo filling on Feb. 11)]

Expert opinions and the basis for same must be stated in expert reports. Fed. R. Civ. P. 26(a)(2)(B) ("The report must contain (i) a complete statement of all opinions the witness will express and the basis and reasons for them…"). Dr. Hennet's failure to offer an opinion on the nature and extent of volatilization expected when a water buffalo is filled via the manhole warrants exclusion of his testimony on this basis alone. *See, e.g.*, *United States v. 685.76 Acres of Land, More or Less in Bethel Township, County of North Carolina*, No. 2:07-CV-2-FL, 2008 WL 11429304, at *2 (E.D.N.C., Mar. 21, 2008) (holding that defense expert reports failed to comply with Rule 26 and explaining that "the Rule envisions that the reports will disclose 'not only what an opposing expert's opinions are, but also the manner in which they were arrived at, what was considered in doing so, and whether this was done as a result of an objective consideration of the facts, or directed by an attorney advocating a particular position.'").

Independently, Dr. Hennet's opinion regarding the nature and extent of volatilization via the manhole is not reliable. Dr. Hennet employed no methodology in support of his opinion other than his observation of the filling of one water buffalo in 2025. Dr. Hennet took no measurements, collected no data,[4] and performed no calculations in support of this opinion. The chemicals of concern cannot be seen with the naked eye; Dr. Hennet could not have seen them volatilizing. And to the extent that Dr. Hennet claims that any observed splashing or aeration equates to volatilization, Dr. Hennet has cited no authority, peer-reviewed literature, data or anything else that supports quantifying volatilization of any chemical based solely on a single visual observation.

Dr. Hennet should not be permitted to testify about the nature and extent of volatilization via manhole filling for the same reasons that the Supreme Court rejected the tire expert's testimony in *Kumho Tire*. Both Dr. Hennet and the expert in *Kumho Tire* employed a mode of analysis – visual inspection – that is subjective. *See Kumho Tire,* 526 U.S. at 155. As in *Kumho Tire*, Dr. Hennet has failed to identify other experts who use his methodology, nor has he cited to any articles or papers that validate his approach. *Id*. at 157. At bottom, as in *Kumho Tire*, the methodology of relying on a visual inspection is unreliable. "A reliable expert opinion must be based on scientific, technical other specialized *knowledge* and not on belief or speculation, and inferences must be derived using scientific or other valid methods." *Oglesby v. General Motors Corp*., 190 F.3d 244, 250 (4th Cir. 1999) (emphasis in original).

Relying on *Kumho Tire,* other courts have excluded expert testimony based solely on visual

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[4] Dr. Hennet did time how long it took to fill the water buffalo, Ex. 1, Hennet Deposition at 260:7-21, but offers no analysis as to how that equates to quantification of volatilization.

observations. *E.g.*, *Precision Fabrics Group, Inc. v. Tietex Int'l, Ltd.*, No. 1:13-CV-645, 2016 WL 6839394, at *8, (M.D.N.C., Nov. 21, 2016). Collecting cases, the court explained:

> First, it strains credulity to believe that anyone can measure near microscopic swelling of a 45-micron sized film. Second, even if Horrocks has such extraordinary vision, in this context its use is not proven to produce reliable results. *Ruffin v. Shaw Indus., Inc.,* 149 F.3d 294, 299 (4th Cir. 1998) (excluding the testimony of the plaintiff's expert on Rule 702 grounds because "[n]o organization, public or private, has been able to independently obtain consistent findings using the techniques employed by" the expert and his equipment). In some instances visual observation could produce a reliable result (such as when something changes color), but here Horrocks' testimony is no more than an *ipse dixit* declaration unsupported by testable, reliable science. *Durkin v. Equifax Check Servs., Inc*., 406 F.3d 410, 420–22 (7th Cir. 2005) (excluding expert testimony as "untestable say-so"); *BASF Corp. v. Sublime Restorations, Inc*., 880 F. Supp. 2d 205, 212–14 (D. Mass. 2012) (holding that an expert "eyeballing" the products at issue in a breach of contract case produced "an unknown error rate" and lacked reliability); *R.F.M.A.S., Inc. v. So*, 748 F. Supp. 2d 244, 282–83 (S.D.N.Y. 2010) (excluding expert testimony that was "little more than conclusory say-so"); *United States v. Frabizio*, 445 F. Supp. 2d 152, 159 (D. Mass. 2006) (excluding expert's testimony distinguishing between real and digitally altered images because his methodology of visual observation was unreliable).

Id. Like the expert in *Precision Fabrics*, Dr. Hennet has failed to provide a scientific basis for his opinion regarding volatilization via manhole filling. Because Dr. Hennet's opinion is based on speculation rather than sufficient facts or data and is not the product of reliable principles or methods, it should be excluded. *See Small v. WellDyne, Inc*., 927 F.3d 169, 177 (4th Cir. 2019) ("Without testing, supporting literature in the pertinent field, peer reviewed publications or some basis to assess the level of reliability, expert opinion testimony can easily, but improperly, devolve into nothing more than proclaiming an opinion is true 'because I say so.'").

B. Dr. Hennet's Opinions regarding Contaminant Losses from Disposal of Spent Spiractor Solids, Sand Filter Backwash Water and Suspended Solids are Speculative and Unreliable and Should be Excluded.

Dr. Hennet opines that "Disposal to waste of spent spiractor solids that contain COCs [contaminants of concern]" and "Disposal to waste of sand filter backwash water and suspended solids that contain COCs" are two of "three main processes or operations that lead to the removal of COCs from the water supply during storage or treatment." [Ex. 2, Hennet Report, at 5-2] Dr. Hennet did not quantify these losses, but he suggests that the loss due to spent spiractor solids is "likely to be significant" and the loss due to disposal of backwash water is "non-negligible." Dr. Hennet applies no calculations and admits he has no data to support contaminant losses via these methods. *Id*. at 5-13. Instead, Dr. Hennet has provided his "best estimates" based on his "education and experience." *Id*.

Dr. Hennet's opinions regarding contaminant losses from disposal of spent spiractor solids, sand filter backwash water and suspended solids are not reliable. He employed no stated methodology other than estimations based on his education and experience. However, when an expert's opinion is based on the expert's experience, the expert must explain "'[1] how that experience leads to the conclusion reached, [2] why that experience is a sufficient basis for the opinion, and [3] how that experience is reliably applied to the facts.'" *SMD Software, Inc. v. EMove, Inc.*, 945 F.Supp.2d 628, 644 (E.D.N.C. 2013) (quoting Fed. R. Evid. 702 Advisory Committee's note (2000)). Nowhere in Dr. Hennet's report does he identify what experience he has that is related to contaminant loss from disposal of spent spiractor solids, sand filter backwash water and suspended solids. Dr. Hennet does not explain how his experience led to his conclusions or why his experience is a sufficient basis for his opinions, nor has he tied any of his experience to the facts of this case.[5]

Dr. Hennet cites Schwarzenbach (1993) as support for his proposition that a portion of COCs would precipitate or sorb on the minerals in spiractor solids and be removed from the water,

[5] Dr. Hennet also does not explain how his education informed his opinion. Dr. Hennet is not a civil, environmental or water resources engineer – in fact, he is not an engineer of any kind. [Ex. 1, Hennet Deposition at 54:6-10 & 23]

but the cited text does not support his conclusions. [Ex. 2, Hennet Report, at 5-12] As a threshold matter, Dr. Hennet does not specify whether these hypothetical contaminant losses are intended as part of the treatment process or incidental. Dr. Hennet has not identified any treatment facility, textbook or peer-reviewed literature that uses, or advocates the use of, sorption onto mineral surfaces as a treatment process for removal of the contaminants at issue here. *See* Ex. 4, Sabatini Rebuttal Report, at 12 (noting that VOC sorption onto mineral surfaces is not discussed as a treatment process in textbooks). To the extent Dr. Hennet maintains that it would be an incidental instead of an intended loss, such losses would be negligible, which is likely why he does not include them in his contaminant loss estimates. *Id*. at 13. Schwarzenbach (1993) discusses removal of organic solutes onto minerals, showing high losses for highly hydrophobic solutes combined with high surface area minerals, while at Camp Lejeune, the contaminants of concern were not highly hydrophobic and the minerals likely did not have the requisite high surface area. *Id*. Moreover, the detention time of the water in the spiractor was 0.15 hours versus the typical 24 hours in the sorption studies reported in Schwarzenbach (1993), leaving minimal time for sorption to occur. *Id*.

Once again, Dr. Hennet's opinion is based on speculation rather than sufficient facts or data and is not the product of reliable principles or methods. *See Small v. WellDyne, Inc*., 927 F.3d 169, 177 (4th Cir. 2019) ("Without testing, supporting literature in the pertinent field, peer reviewed publications or some basis to assess the level of reliability, expert opinion testimony can easily, but improperly, devolve into nothing more than proclaiming an opinion is true 'because I say so.'"). For these reasons, it should be excluded.

C. Dr. Hennet's Results-Driven Opinion regarding Well HP-634 Contaminant Concentration Data should be Excluded.

Dr. Hennet opines that "[s]upply well HP-634 was not contaminated with TCE." [Ex. 2, Hennet Report, at 5-31] He reaches this conclusion by disregarding a sample collected on January 16, 1985 at well HP-634 with a measurement of 1,300 ug/L TCE for four reasons, none of which justify this cherry-picking of data.

First, Dr. Hennet states that "sample vials for January 16, 1985, the source of the 1,300 ug/L measurement, were part of a set of vials that were broken during transport." *Id*. However, he does not say that the samples for *this* analysis were broken, so, as Dr. Konikow points out, the relevance of this assertion is not apparent. [Ex. 5, Konikow Rebuttal Report, at 22 ("I doubt that the lab would or could perform an analysis or report a value on a sample taken from a broken vial.")] At deposition, Dr. Hennet speculated that "all the samples could have been contacted by the broken vials in the package," but he has pointed to no evidence of this. [Ex. 1, Hennet Deposition, at 195:19-24.] He also posited that the broken vials raised a "QA/QC flag," such that the Navy should have resampled, *id*., but he identifies no QA/QC standards from the laboratory at issue or from any other laboratory in support of this opinion.

Second, Dr. Hennet writes that "[a] summary of the data for HP-634 attributes the 1,300 ug/L value to chloroform, not TCE. In that report summary, TCE is attributed a value of 10 ug/L." [Ex. 2, Hennet Report, at 5-31] However, the laboratory that actually performed the analysis reported 1,300 ug/L,[6] and Dr. Hennet provides no explanation as to why the summary report should be trusted or believed over the primary source laboratory report. And elsewhere, Dr. Hennet insists that he relies on original or primary documents as opposed to summaries. [*E.g.*, Ex. 1, Hennet Deposition, at 214:24-215:1 ("I put more credential to basically documents that are close to when things happen or when things happened."); 240:12-14 (I just always to [stet] the original document,

[6] Ex. 1, Hennet Deposition, at 199:25-200:12 (agreeing that Exhibit 17, the laboratory data sheet, shows 1,300 ug/L and that nothing on the sheet says anything about the sample being compromised or there being an issue with the sample).

or as close to that as I can do")[7]; 208:25-209:5 (noting that chronologies tend to have errors); 204:8-12 (disregarding ATSDR documents because they are "not primary source of information")]

Third, Dr. Hennet asserts that "When HP-634 was in use and pumping, the data show that the well was not contaminated with TCE." [Ex. 2, Hennet Report, at 5-31] The fact that there were two non-detects (which were taken only 6 days apart) for HP-634 "when the well was pumping"[8] does not invalidate this sample. The value of contaminants measured at Camp Lejeune changed by similarly large magnitudes at other wells in short time frames. For example, the value of PCE at TT-26 changed from 1580 to 3.8 ug/L in successive samples taken 4 weeks apart, mirroring the change at HP-634 from non-detect to 1,300 ug/L in a similar 4-week time frame. [Ex. 5, Konikow Rebuttal Report, at 22] This variability in sampling data is characteristic of groundwater-quality data and is expected at sites like Camp Lejeune.[9]

Fourth, Dr. Hennet claims that "the 1,300 ug/L reported value for TCE is an outlier by comparing with the entirety of the data for HP-634." [Ex. 2, Hennet Report, at 5-31] The "entirety of the data" consists of four non-detects (two taken within six days of each other in December 1984; one in November 1986; and one in January 1991) and the 1,300 ug/L sample that Dr. Hennet chooses to disregard. As stated above, variability in sampling data is characteristic of groundwater-quality data and is expected at sites like Camp Lejeune. [Ex. 5, Konikow Rebuttal Report, at 22]. Dr. Hennet does not address the fact that, as of November 1984, TCE had moved very close to Well HP-634 from its previous location in the industrial area in all three model layers and, specifically in Model Layer 3, the TCE plume is coincident with the location of well HP-634.

[7] This quote has been modified to conform to Dr. Hennet's signed errata sheet.
[8] Plaintiffs dispute that HP-634 was not operational on January 16, 1985. *See* Ex. 6, Maslia Rebuttal Report, at 19-23.
[9] To the extent Dr. Hennet is adopting Dr. Spiliotopoulos's allegations regarding contaminant transport in support of this opinion, Plaintiffs incorporate part IV.D of their Motion to Exclude Certain Opinions of Alexandros Spiliotopoulos into this motion as if set forth herein.

Id. at 22-23. Nor has Dr. Hennet explained the relatively high levels of DCE and VC in the same January 16, 1985 sample, which refute the 1,300 ug/L TCE measurement being an isolated "outlier." *Id*.

Dr. Hennet's rejection of the January 16, 1985 sample is not based on sufficient facts or data, nor is it the product of reliable principles and methods. Fed. R. Evid. 702. Dr. Hennet's labeling of the 1300 ug/L sample as "anomalous"[10] without the identification of a reliable methodology, performance of any calculations, or citation to authority is speculative and unreliable, and is the sort of cherry-picking of data that has been rejected by the Fourth Circuit. "Result-driven analysis, or cherry-picking, undermines principles of the scientific method and is a quintessential example of applying methodologies (valid or otherwise) in an unreliable fashion. '[C]ourts have consistently excluded expert testimony that 'cherry-picks' relevant data,' because such an approach 'does not reflect scientific knowledge, is not derived by the scientific method, and is not 'good science.'" *In re Lipitor*, 892 F.3d 624, 634 (4th Cir. 2018) (citing *EEOC v. Freeman,* 778 F.3d 463, 469 (4th Cir. 2015) and *In re Bextra & Celebrex Mktg. Sales Practices & Prods. Liab. Litig.,* 524 F. Supp. 2d 1166, 1176 (N.D. Cal. 2007).

Significantly, all of the work Dr. Hennet has done to form his opinions in this case was done for or in anticipation of litigation, *i.e*., "expressly for the purpose of testifying." *Daubert v. Merrell Dow Pharms, Inc*., 43 F.3d 1311, 1317 (9th Cir. 1995). In contrast, neither the laboratory at issue nor the ATSDR – neither of which performed their work in anticipation of litigation – determined that this sample was "anomalous" or "erroneous." Dr. Hennet's results-driven analysis for HP-634 is unsupported, unreliable, and should be excluded.

[10] Ex. 2, Hennet Report at 5-32.

D. Dr. Hennet's Results-Driven Opinion regarding "Representative" Flow Paths and Travel Time at TT-26 is Unreliable and should be Excluded.

Dr. Hennet opines that the travel time for PCE to reach Well TT-26 was 15 to 25 years, based on "three *representative* flow paths." [Ex. 2, Hennet Report at 5-15 (emphasis added)] Dr. Hennet does not provide a basis in his report for these flow paths being "representative," and he could not articulate a basis for this at his deposition. [Ex. 1, Hennet Deposition at 270:13-271:25] As explained by Dr. Konikow in his rebuttal report, Dr. Hennet's analysis fails to consider variation in hydraulic gradients, which results in faster flow of water and contaminants closer to the well, and does not include the critical flow path in the shallow aquifer where travel time would be closer to 3.5 to 5 years. [Ex. 5, Konikow Rebuttal Report, at 29 (describing that "the hydraulic gradient potentially driving downward flow is about 3 times greater closer to the well than it is halfway between the well and the contaminant source" and "the assumption that it is the same at all locations cannot be supported. Dr. Hennet does not account for the steeper vertical gradient in layer 2 for the path closer to the pumped well, nor does he account for the faster velocity in layer 3 when the travel distance is only 200 ft.")] These are basic fundamentals of hydrogeology and groundwater hydraulics, and Dr. Hennet does not and cannot explain why these large variations in hydraulic gradient, which can be readily estimated, should be disregarded. A more critical flow path would follow a longer path in the shallow aquifer, just 200 feet further than the maximum value of 800 feet considered by Dr. Hennet, and therefore a shorter flow distance in the slower deeper aquifer. This flow path is certainly representative of how contaminants can migrate away from ABC Cleaners and would yield a travel time as short as about 3.5 years (assuming Dr. Hennet's average values). *Id.* Without any explanation or scientific basis, during his deposition Dr. Hennet declared that consideration of this more critical flow path was "too extreme."

Dr. Hennet has failed to identify or articulate a reliable methodology in support of his selection of "representative flow paths," and, as a result, has no support for his opinion regarding PCE travel time to Well TT-26. In the absence of pre-litigation research or peer review, it is imperative that an expert "point to some objective source – a learned treatise, the policy statement of a professional association, a published article in a reputable scientific journal or the like – to show that they have followed the scientific method, as it is practiced by (at least) a recognized minority of scientists in their field." *Daubert*, 43 F.3d at 1318-19. Dr. Hennet has failed to point to any external source to validate his methodology.

Dr. Hennet's "representative flow paths" were crafted at the DOJ's request for purposes of litigation. His report does not cite to any literature, standards, or any other authority in his field in support of his overly simplified theory. Instead, his opinions regarding PCE's flow paths and travel time to Well TT-26 are classic *ipse dixit* and should be excluded. *See General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (stating that "nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert."); *Small v. WellDyne, Inc.*, 927 F.3d 169, 177 (4th Cir. 2019) ("Without testing, supporting literature in the pertinent field, peer reviewed publications or some basis to assess the level of reliability, expert opinion testimony can easily, but improperly, devolve into nothing more than proclaiming an opinion is true "because I say so.")

<u>CONCLUSION</u>

For the foregoing reasons, the PLG respectfully requests the Court to exclude the opinions discussed herein offered by Remy J.-C. Hennet, Ph.D.

[Signature page to follow.]

DATED this 29th day of April 2025.

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CERTIFICATE OF SERVICE

I, J. Edward Bell, III, hereby certify that the foregoing document was electronically filed on the Court's CM/ECF system on this date, and that all counsel of record will be served with notice of the said filing via the CM/ECF system.

This the 29th day of April 2025.

*/s/ J. Edward Bell, III*________________

J. Edward Bell, III

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NORTH CAROLINA
SOUTHERN DIVISION
Civil Action No.: 7:23-CV-897

IN RE:	)
	)
CAMP LEJEUNE WATER LITIGATION	)
	)
This Pleading Relates to:	)
	)
ALL CASES.	)
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TABLE OF EXHIBITS
IN SUPPORT OF PLAINTIFFS' MOTION FOR AN ORDER EXCLUDING CERTAIN OPINIONS OF REMY J.-C. HENNET PH.D.

Ex. 1 – March 20, 2025 Deposition of Remy J.-C. Hennet, PhD

Ex. 2 – December 9, 2024 Expert Report of Remy J.-C. Hennet, PhD

Ex. 3 – April 21, 2025 DOJ Letter to PLG

Ex. 4 – January 14, 2025 Expert Rebuttal Report of David Sabatini, PhD

Ex. 5 – January 13, 2025 Expert Rebuttal Report of Leonard Konikow, PhD

Ex. 6 – January 14, 2025 Expert Rebuttal Report of Morris Maslia, PE

EXHIBIT 1

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NORTH CAROLINA
SOUTHERN DIVISION
NO. 7:23-CV-897

IN RE:)
)
CAMP LEJEUNE WATER LITIGATION)
)
)
This Document Relates to:)
ALL CASES)
_______________________________)

VIDEOTAPED DEPOSITION OF
REMY J-C. HENNET, PH.D.,

a witness herein, called by the Plaintiffs for examination, taken by and before Ann Medis, RPR, CLR, CSR-WA, and Notary Public in and for the Commonwealth of Pennsylvania, via Zoom Videoconference, at the offices of Motley Rice, 401 9th Street, NW, Washington, DC 20004, on Thursday, March 20, 2025, commencing at 9:05 a.m.

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P R O C E E D I N G S

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THE VIDEOGRAPHER: We are now other record. My name is Bradley Loy. I'm a videographer for Golkow. Today's date is March 20, 2025. The time 9:05. This deposition is being held at 401 9th Street, Northwest, Washington, D.C., taken in the matter of Camp LeJeune Water Litigation, for the United States District Court for the Eastern District of North Carolina, Southern Division. The deponent is Remy J.-C. Hennet.

Will counsel please identify themselves.

MR. DEAN: Good morning. This is Kevin Dean here on behalf of THE PLG.

MS. O'LEARY: Allison O'Leary on behalf of the United States.

MS. BAUGHMAN: Laura Baughman on behalf of plaintiffs.

MS. BOLTON: Devin Bolton on behalf of the plaintiffs.

MS. HORAN: Alanna Horan on behalf of the United States.

MS. JOHNSON: Margaret Johnson on behalf of the plaintiffs.

THE VIDEOGRAPHER: Will the court reporter please swear in the witness.

REMY J.-C. HENNET, PH.D.,
having been first duly sworn, was examined
and testified as follows:

EXAMINATION

BY MR. DEAN:

Q. Good morning, Dr. Hennet.
A. Good morning.
Q. Did I pronounce your name correctly?
A. Yes, you did.
Q. I'm going to try to always refer to you as Dr. Hennet. But I've read so much about you in the last several months, it may very be I mistakenly refer to you as Remy, but I don't do so out of disrespect. Okay.
A. You choose.
Q. Thank you. You just swore under oath to tell the truth. Do you understand what that means today?
A. Yes, I do.
Q. And are you having any illnesses today or anything wrong with you that would prevent you from completely responding to all my questions and telling the truth?

A. I do not.
Q. You're not under any medications or anything like that that would cause you not to be able to testify truthfully?
A. I am not.
Q. From your CV, I believe at least since 2020 you've been deposed about three times; right?
A. I would have to look at my CV.
Q. We'll look at that in a minute. My point is there's a few typical ground rules for depositions. First of all, if you feel like you need to take a break at all during the deposition today, you tell me, and I'll be happy to stop and we'll take a break. I recognize the camera is rolling and a lot of people in the room, but we'll be as informal as we can. And if need to take a break, you just and I'll stop. Okay?
A. I will.
Q. If, however, we do take a break, if you would he refrain from talking with the lawyers with regard to your testimony today, I would appreciate that. Okay?
A. Yes.
Q. Now, sometimes I ask two questions in one. I'll be honest with you. It's called a

compound question. Lawyers may even object. But what I want to make sure you do today is I ask a question that you understand and you feel like you can respond. And if I don't, you tell me you don't understand my question, and I'll rephrase it or re-ask it. Okay?

A. I do understand.

Q. Because I want to be able to rely today on your responses in the sense that you understood my question. Okay?

A. I understand that.

Q. So if you answer a question and you don't ask me to re-ask it or that you don't understand it, then I'm going to assume you understood my question. Fair?

A. Fair.

(Hennet Exhibit 1 was marked.)

BY MR. DEAN:

Q. Now I'm going to show you what I've marked as Deposition Exhibit No. 1 Dr. Hennet. It's called a deposition notice. And attached to it is a subpoena. At the back of the subpoena is a list documents that we asked that you and S.S. Papadopulos & Associates produce to us.

Do you see that list?

A. Yes, I do.
Q. Now, my first question about that is: Did you bring anything today additional that that was responsive to that subpoena?
A. No. I don't have anything.
Q. Have you seen that list of items to bring to the deposition attached to the subpoena before today?
A. I have.
Q. Did you personally or anyone at your direction after seeing that subpoena undertake an effort to gather documents?
A. To the extent that we could answer those questions, it was done. I asked, you know -- I reviewed my files to respond to the subpoena. Everything I did have, I just provided it to counsel.
Q. And when would you have provided that to counsel after receipt of the subpoena?
A. I don't recall when.
Q. Actually, I've got a copy right here myself. Look at the date of the subpoena.
The original subpoena, it was the middle of February. I'll get a specific date in just a moment. But it was sometime in the middle of

February that the subpoena was first served with a deposition notice after we agreed on your date for your deposition.

What my question you to is, that's a little over 30 days ago, 30, 35, 40 days ago. Do you know when you responded and provided documents to the Department of Justice to produce in this case after receipt of the first subpoena?

MS. O'LEARY: Object to the form and foundation.

THE WITNESS: I do not recall when.

BY MR. DEAN:

Q. Now, you said you supplied some materials that you could find or that were responsive.

Did you hand deliver them, or did you send them electronically, a share file? Do you remember the delivery method of that information?

A. I do not recall the details of it, but most of it was done, I suppose, electronically.

Q. Did you send an email forwarding the responsive information or a staff member do that?

A. I don't recall who did it.

Q. But either you or someone working at your direction would have sent an email to the

Department of Justice or one of its attorneys saying, hey, here's attached FYI that you asked for or a response to the subpoena. It would be some sort of general email along those lines; correct?

A. I don't recall. A lot of the interactions with counsel was, you know, meetings, speaking over the phone or those kind of interactions.

Q. Understood. But what I'm trying to do is after receipt of the subpoena, which was sometime in February, February 12, 2025 -- you earlier testified you sent information, documents, things that were in response to the subpoena electronically; right?

MS. O'LEARY: Object to foundation and form.

THE WITNESS: I didn't say that. I say some of it was electronic, not all of it.

BY MR. DEAN:

Q. And who would have sent it?

A. I don't recall. It could be me or it could be -- it would have been me, I suppose.

(Hennet Exhibit 2 was marked.)

BY MR. DEAN:
     Q.   Let me go ahead and mark as Exhibit 2 something called an objection. Now, I'm not sure if you've seen this document or not. Just for the record and for your benefit, this is what is referred to as a response and objection to Exhibit 1, the subpoena.
          Do you see that?
     A.   I'll look at it.
     Q.   You can actually go to last page and see it was served on March 14, 2025. It's not important necessarily that you go through it. I don't have any specific questions for you. You can glance that you it. I guess I'm trying to see if you had seen it before today.
          (Witness reviewed the exhibit.)
          THE WITNESS: It sounds familiar, but I don't recall by memory if I saw this exact document.
BY MR. DEAN:
     Q.   Now, get Exhibit 1 back out, if you don't mind, and turn to Exhibit A that's at the back that has the list of documents, if you don't mind.
          MS. O'LEARY: What page is that?

MR. DEAN: Just Exhibit A behind the subpoena.

BY MR. DEAN:

Q. Do you see that there's basically 16 numbered items over three pages?

A. Yes. I do see 16 paragraphs.

Q. Now, I'll mark it in a moment, but I received I guess it was last Friday and then last night a supplemental bill, invoice. I don't remember the totality of the pages, but they were there was invoices from S.S. Papadopulos & Associates to the Department of Justice for billings in this case.

Do you know what I'm generally referring to?

MS. O'LEARY: Object to the form foundation.

THE WITNESS: I can guess, but I don't know exactly what you are referring to.

BY MR. DEAN:

Q. I'll show it to you in a moment. Let's read together No. 5. It asks for all bills, invoices or other documents related to payments from the United States or any of its agencies to you, S.S. Papadopulos, or principals or agents of

S.S. Papadopulos relating to any work completed by Remy J.C. Hennet and Alexandros Spilotopoulos.
Do you see that?
A. I see that.
Q. And then No. 6 asks a little -- let me stay on five just for a moment.
When you -- I'll get to a point where we talk about everything you've done to prepare for your deposition, but let's just use yesterday for an example. I assume you did a little prep work of some sort yesterday.
A. I did.
Q. Now, at the end of the day, did you write down on a note pad your time, or did you go into a computer or a program or something and input your time or someone do it for you?
A. I did not do that yesterday.
Q. But is that normally how you track your time?
A. Normally I track my time daily or sometimes it takes two days. It depends if I'm on travel or those type of issues.
Q. I'm way behind on my time, so don't feel bad. Lawyers do the same thing.
How do you keep track of your daily

activities though? Do you handwrite on a note pad or do you put it into a computer?
A. We have a system. It's a software system into which we enter basically our time for billing purposes.
Q. And what is that program called?
A. I don't know. I don't recall the name of it.
Q. It's generic, but there's one called Timekeeper. You don't remember the name of the computer program?
A. I don't remember the name of the computer program.
Q. Have you in the past -- say you wanted to do a review of your time. Maybe someone asked you to take a look at your time. Is that something that you could print out a summary of your time so you can see what you entered into the computer, say, for a month, like last February?
Could you print out your time entries to see what you did in case there was a need?
A. I don't know how to do it, but admin, administration staff is doing that. And if I wanted to see something, I would have to request it.

Q. And who would you go to to request that information?

A. To our administrative person.

Q. And who is that?

A. Her name is Seema, S-E-E-M-A, and she's one of the administrative person that I would request that from.

Q. No. 6 is a similar question, but a little different. It says all bills, invoices or other documents relating to payments from the U.S. or any of its agencies to you, S.S. Papadopulos principals or agents, related in any way to Camp LeJeune water litigation.

Do you see that?

A. I see that.

Q. It also refers to the CLJ litigation. It refers to the word "remediation" related to Camp LeJeune.

Do you see those?

A. It says from 2004 through the present.

Q. Correct. My question to you on 5 and 6 -- let's go to 5. Did you respond to No. 5 and send anything or documents to the Department of Justice in response to No. 5?

A. I believe it was done, but via

administration, not me.

Q. And that related to your work on this case?

A. I do not know exactly what was transferred.

Q. No. 6, did you gather any historic documents, bills, invoices or anything related to your time working on Camp LeJeune issues, remediation issues from 2004 to the present? Did you send anything to the Department of Justice to respond to No. 6?

MS. O'LEARY: Object to form.

THE WITNESS: I did not personally, but admin may have.

BY MR. DEAN:

Q. You don't know if they sent documents responsive to 6 or not?

A. I do not know what I could find because we are talking about a long time ago.

Q. No. 7 says all timekeeping and billing records related to time you did any work on Camp LeJeune litigation from the time you or S.S. Papadopulos were first retained, hired or contracted.

Do you see that?

MS. O'LEARY: Object to foundation.
THE WITNESS: I see that.
BY MR. DEAN:
Q. Did you or someone S.S. Papadopulos & Associates send any other supporting timekeeping and billing records related to work done by you or S.S. Papadopulos & Associates from the first time you were retained for anything related to Camp LeJeune? Do you know if you responded to No. 7?
A. Again, that would have gone through admin, administration at SSPA. That's what I can recall.
Q. With regard to five, six and seven, we've now established that something was sent. You just don't know specifically what it was. If it was done, it was through Ms. Seema.
MS. O'LEARY: Object to form.
THE WITNESS: I don't know if it was done through Ms. Seema, but I don't know what was sent.
BY MR. DEAN:
Q. No. 8 talks about emails. It says communications, but it's primarily looking for letters or emails between S.S. Papadopulos and the U.S. from 2004 to the present related to any

issues concerning Camp LeJeune, remediation related to Camp LeJeune.

Do you see No. 8?

MS. O'LEARY: And object to form and foundation.

THE WITNESS: I see No. 8.

BY MR. DEAN:

Q. And you see it asks for stuff back from 2004? Do you see that?

A. I see that.

Q. Did you personally search for documents that were responsive to No. 8 and provide them either to administration to provide to the Department of Justice or you personally remember sending some stuff to the Department of Justice to respond to No. 8?

A. Well, all communications by email was basically for this litigation always with a lawyer present in the conversation, and those communications particularly the lawyers have it.

Q. The lawyers what?

A. Lawyers would have that to the extent that they do exist.

Q. Let's go back to my question. I understood your answer, but my question was a little different.

My question was: After getting this subpoena sometime after February 12, 2025, did you personally go search historic emails, records, communications, letters from 2004 to the present and provide them to the Department of Justice?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. That was my question.

MS. O'LEARY: I'm sorry. Object to foundation.

THE WITNESS: I don't recall exactly. The issue is can I retrieve things all way 20 years back. Personally, I can't because we have an archive system. I am not understanding how it is done.

Since then we have changed computer systems. We've changed location. So that's not the type of thing that I do. But it was looked at to see what we could find. And my understanding is Dr. Spiliotopoulos might have done something. I don't know. Personally I gave everything I have to the Department of Justice. That's what I recall.

BY MR. DEAN:

Q. Let me go back to my question one more time. I think I understood it, but I just want to be clear.

You didn't personally undertake an effort to search your computer or any file servers or file folders for emails or other communications as far back as 2004 related to Camp LeJeune issues? You didn't personally undertake that effort?

A. I looked at what I have on my computer and I gave -- I responded to this the way -- I looked. What do I have? I found no email that are old. Whatever emails that are related to this case were basically always in the presence of counsel, and those were -- counsel has copies of it because they were involved.

Q. I'll use a particular person's name, Scott Williams. He's a NAVFAC employee.

Does that name sound familiar to you?

A. The same sounds familiar to me.

Q. But I'm just using that as an example. You know that Camp LeJeune Justice Act and this case was formally initiated sometime in the summer of 2022.

MS. O'LEARY: Object to foundation.
THE WITNESS: Can you repeat the question, please?
BY MR. DEAN:
Q. Yes. This case, the Camp LeJeune Justice Act litigation for which we're here today was initiated in the summer of 2022.
MS. O'LEARY: Object to form.
THE WITNESS: I don't recall exactly when that would have been initiated.
BY MR. DEAN:
Q. Your billing records, which we'll get to in a minute, I think your first invoice was in September of '22.
A. That's possible.
Q. So let's separate. I want to talk to you about 2004 until June, July, August of '22, that time period. Okay?
Did you search for any emails, communications, letters between yourself and any government agency, EPA, Navy, Scott Williams? Did you search for any old emails between 2004 and July of '22?
A. There are none that I could find on my computer.

Q. And you said something about them being archived in another location. You don't have access to it personally. Can you tell me what you're referring to?

MS. O'LEARY: Object to foundation.

THE WITNESS: I would be referring to, for example, reports that I wrote if I did and other documents that were part of the files at the time.

BY MR. DEAN:

Q. Do you know anyone that has filed -- let me change it a little. Withdraw that.

Have you or anyone at S.S. Papadopulos & Associates filed a Camp LeJeune Justice Act claim?

MS. O'LEARY: Object to foundation.

THE WITNESS: I have not, and I don't know about -- I don't know what all other people do.

BY MR. DEAN:

Q. Do you know of a relative that you have or a friend that has filed Camp LeJeune Justice Act claim?

A. I do not know of any such person. I want to say I don't know if they did it or not. I do not know anybody who did.

Q. Now, do you remember when you became aware of a Marines military base known as Camp LeJeune? And you don't have to be on a specific date. Do you know generally when you first learned? Is that something you learned in high school or college or after you became a professional? Do you know when you first became aware there was a Marines base called Camp LeJeune?

A. I do not recall when. Camp LeJeune is a big important Defense Department facility. I read the newspaper. So I don't know when I would have first heard about Camp LeJeune, per se.

Q. Do you remember when you first might have been hired by any United States government agency or military organization to do any sort of work at Camp LeJeune?

A. Yes. That would have been around the mid 2005 period. I know that in 2005 I did work on Camp LeJeune issues.

Q. Do you remember who contracted or hired, reached out to you or S.S. Papadopulos to do some work related to Camp LeJeune?

A. The Department of Justice.

Q. So the first time you were asked do any work related to Camp LeJeune, as best you can remember as you sit here today, it had to do with the Department of Justice reaching out and saying inquiring about retaining you and your company to do some work?

A. My recollection is that the person who has been -- was contacted for doing work was Gordon -- Mr. Gordon Bennett. And then I got involved as well.

Q. We'll come back to that in a moment.

(Hennet Exhibit 3 was marked.)

BY MR. DEAN:

Q. Let's go ahead and mark your report as Exhibit 3. I've handed you Exhibit 3. Can you identify Exhibit 3?

A. The first page of Exhibit 3 is expert report of Remy J.C. Hennet.

Q. And it's dated December 9, 2024. Do you see that?

A. That's correct.

Q. At the time you issued this report -- I think your signature on it at the end. Your signature is on page 2 of this document.

Do you see that?

A. That's correct.

Q. And it says it's an expert report of Remy J.C. Hennet, and it's got the style of this case.

Do you see that?

A. Yes, I do.

Q. At the time of your signing this report, do you believe you had all of the information and data in order to provide the opinions that are listed in this report?

A. At the time of my expert report, all the opinions that I expressed in the report were based on the information that I had at that time and before.

Q. And at that time, to the extent you have information and opinions in this report, you had at that time all the information you felt like and documents and data to issue these opinions?

A. Yes, I did.

Q. Now, you issued it December 9. We're here today on March 20, 2025, about three months, give or take.

Is there any of your opinions in this report that you want to change, take back, modify or add to so that it is correct and complete?

A. All the opinions in my report I stand by today. I want to add that in February after my report, I did go back to Camp LeJeune, and I did some measurements that basically -- I performed those measurements.

Q. I believe I remember seeing some of that, and we'll get it to later this morning. I think it was the like February 11 that you went back because there's a couple pages of handwritten notes.

Does that sound about right about the date?

A. That's right.

Q. Why did you -- what triggered you to go back to Camp LeJeune to do those measurements you just referred to?

A. A couple of things. If I recall, there were two affidavits that were basically produced after my report was submitted that described some witness of some operations at Camp LeJeune. And that was one element. And the other element was in the report of Dr. Sabatini, there was a general agreement on the methodologies I applied to calculate losses from the water, losses of the contaminant of concern from water that the parameters of was a disagreement with

Dr. Sabatini, not the methodologies. And I wanted -- in particular there was a parameter that I wanted to establish, and I did that.

Q. When you went back on February 11, 2025, that was not the first time you had been on on board Camp LeJeune?

A. That was not the first time.

Q. If I remember correctly some old emails, which I can pull out if I need to, but I think you were involved in some issues related to advising on some remediation issues and were at Camp LeJeune sometime in 2005 for the first time.

MS. O'LEARY: Objection to form.

BY MR. DEAN:

Q. Does that sound about right?

A. I don't recall those. That's possible. In 2005 I was involved in work for the Department of Justice on issues at Camp LeJeune that it had nothing to do with this case. It was a different case or different cases. And that's what I recall.

Q. How many times do you think between 2005 and February 11, 2025, when you went back this most recent, how many times do you think you've actually been to Camp LeJeune, ballpark?

A. I believe -- my recollection is for this particular case here, I went to Camp LeJeune, I believe, three times. Before that, I don't recall, but it was more than once.

Q. We'll get to the billing records in a little bit, see if we can figure that out. But what you're telling me right now as best you remember is somewhere between August of '22 and today, you think you've been there approximately three times?

A. That's what I recall at this moment.

Q. Had you spent the night in the area of Jacksonville, North Carolina while doing some work or meetings at Camp LeJeune those three times?

A. Not the three times.

Q. At least once?

A. Yes.

Q. So you've made three trips. One of those trips you stayed multiple days or at least two days?

A. I think that's correct. One of the trip may have spanned over two days. I believe so.

Q. Before February 11, 2025, had you gone to the Tawara Terrace water treatment plant and taken a look at it?

A. Tawara Terrace treatment plant doesn't exist anymore. Anymore I want to add.
Q. I understand. So you've never physically inspected personally from 2005 to 2025 the Tawara Terrace water treatment facility?
A. Not the water treatment facility at Tawara Terrace because it was not there to be visited.
Q. Do you know when the water treatment plant at Tawara Terrace was dismantled?
A. I do not recall when it was dismantled.
Q. But you've personally never been there?
A. In the Tawara Terrace water treatment plant, I've never been in there.
Q. And S.S. Papadopulos & Associates was retained in 2022 to work on this Camp LeJeune litigation case. You told me that earlier. Is that fair?
A. That's correct.
Q. And is that first time that Mr. Spilotopoulos started doing some work on this case along with you?
MS. O'LEARY: Object to foundation.
BY MR. DEAN:
Q. For this litigation case.

MS. O'LEARY: Same objection.

THE WITNESS: For this litigation case, I was the one who was contacted. And I was contacted to evaluate the work that had been done by ATSDR and to basically evaluate whether or not the data that was or the values that were estimated by ATSDR would be quantitatively reliable to provide reliable values for the chemical of concern in the water supply. That, as I recall, was basically the task.

BY MR. DEAN:

Q. Dr. Spilotopoulos or Mr. Spilotopoulos -- I can't remember if he's a doctor or not; I apologize -- he would have started doing some work on this case, as far as this litigation case sometime in '22 along with you?

MS. O'LEARY: Object to foundation.

THE WITNESS: It would have been a little bit after I was involved.

BY MR. DEAN:

Q. Fair.

A. That's what I recall.

Q. Between '22 and '25, did he make independent trips to Camp LeJeune separately from you, if you remember, or was he accompanying you on these two or three times that you went to Camp LeJeune?

A. As far as he's concerned, you will have to ask him. As far as I am concerned, he was there one time when I was there.

Q. Do you know whether he was able to personally go take a look at Camp LeJeune Tawara Terrace water treatment plant between '22 and '25?

A. Again, Tawara Terrace plant doesn't exist. So he could not have visited it.

Q. Now, Hadnot Point water treatment plant have, you ever in the last -- since August of 2022, have you gone to the Hadnot Point water treatment plant and done any inspection or done any work there?

A. Can you repeat the question? I didn't catch the time.

Q. Since August of '22.

A. Yes. I have been there.

Q. And when have you been that?

A. Every time I went to the base, I went to that plant.

Q. So approximately three times?

A. Approximately three times. That's what

I recall, yes.

Q. And that includes two times before February of '25 and you also went a third time approximately -- we'll look at the records -- on February 11 of this year, you went back to the treatment plant?

A. I went back to the treatment plant, and the other times I also went to the treatment plant.

Q. The other two times -- again dates are not important to me -- was the plant operating?

A. Hadnot Point?

Q. Yes.

A. Yes.

Q. Do you remember if those prior two occasions you did any inspections or take a look at the spiractors?

A. Every time I went to the plant, I did that.

Q. Now, who all from S.S. Papadopulos & Associates has done some work on this case along with you to support your work? I know about Dr. Spilotopoulos. Whom else?

A. There were others. I do not remember each one of them probably because there were quite a few, I suppose, but I can give you the one I remember.

Q. That's fine.

A. Dr. Soderberg.

Q. Can you spell last name for us?

A. S-O-D-E-R-B-E-R-G. He's a Ph.D. staff member. That would be one. Mr. Saul, S-A-U-L, Allen, A-L-L-E-N. That would be another one.

Q. Can you give a title or a position as we go through these? You said Dr. Soderberg. Is he a principal?

A. He's not a principal, but he's, I believe, an associate.

Q. How about Mr. Allen?

A. He's not a principal. He's basically our document manager.

Q. Before we go keep going through the list, what is your title at S.S. Papadopulos & Associates?

A. I am a senior principal.

Q. How many senior principals are there at S.S. Papadopulos & Associates approximately?

A. Fully active, there are two.

Q. And who are those?

A. The other one is Dr. Matt Tonkin,

T-O-N-K-I-N.

Q. When you refer to yourself and Mr. Tonkin as senior principals, do you have an ownership interest or a share interest in S.S. Papadopulos & Associates?

A. I do.

Q. And what is the nature of that ownership interest?

A. The ownership structure at my company is basically you have two types. Every employee has some shares via what is called an ESOP, E-S-O-P, employee-owned stock partnership.

Q. Yes, sir.

A. Then you have the other ownership share types, which are basically -- it's a private company, and other ownership types which is basically -- I don't know how many people have such shares, but 10, 15 maybe.

Q. So what is the nature of your ownership of shares in S.S. Papadopulos & Associates?

A. It's a minority position.

Q. Can you quantify what that minority position is? So, for example, you said there's two principals, yourself and Mr. Tonkin.

When you say minority, I assume you both

don't own 50 percent of the company; is that fair?
MS. O'LEARY: Object to foundation and fair.
THE WITNESS: That's fair. I want to -- we are not the only two principals. We're the two full-time senior principals. You have additional senior principals who are basically retired, but still involved. And you will you would have that situation. And the ownership is basically distributed including those people.
BY MR. DEAN:
Q. How many is the total? Yourself and Mr. Tonkin or Dr. Tonkin. How many others are there that are principal shareholders?
A. Principal?
Q. Yes, sir.
A. Well, you have the one who are semiretired. They would be senior principals at least.
Q. How many and who are they?
A. Three.
Q. Who?
A. So the first one, the oldest one, if you wish, is still there, still active, not in a full time. It's Dr. Papadopulos. Dr. Papadopulos is

the founder of the firm. He used to be at the USGS and basically started his firm in 1979.

The second one would be Mr. Steve Larson, L-A-R-S-O-N. He joined Mr. Papadopulos or Dr. Papadopulos shortly after the firm started up. And he also used to be at the USGS. Dr. -- Mr. Larson was basically working on the precursor of MODFLOW at the USGS and did some recognized work of that nature. And then he joined Dr. Papadopulos.

After that, maybe three or four years later, I do not know exactly the timing, Dr. Charles Andrews, A-N-D-R-E-W-S, joined the company. And basically they are considered the three founders of the company.

Q. And they're semiretired, not full-time principals, I guess, is the best wait you described them; right?

A. That's right. Different duties.

Q. So those five have a majority ownership interest together?

A. I do not believe so, but I don't know.

Q. Now, did either Dr. Tonkin or any of the other semiretired principals, Dr. Papadopulos, Mr. Larson, Mr. Andrews, did any of them also work on any issue related to this litigation over the last three years and did some billing that you would know about?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. Or is it just you?

A. I do not believe that those persons have worked on this case.

Q. So if I see your name on billing records or time records -- not your name, but it says senior principal and those hours that are attributable to that senior principal, the only person that would be to your knowledge would be referring to work yourself did?

A. I believe that's correct.

Q. Now, other than Dr. Soderberg, Mr. Allen, who else has done some work on this case to support you?

A. Right now I don't recall all of them, but, you know, for example, Mr. Cousin, Jim Cousin, C-O-U-S-I-N, has done some work. There are others, but I would have check the billing again if I wanted to know exactly.

Q. What billing records would you have to check?

A. Well, I would ask admin to tell me who worked on that project probably, and I think they would be able to tell me.
Q. They have to pull up some time records or a summary of time records to figure that out for you; right?
A. I don't know exactly how they do it. I would expect an answer from them.
Q. There's another name that I've noticed in some of the billing records for some travel whose last name was the same as yours.
A. Yes. That's correct.
Q. And who would that be?
A. Crystal Hennet, she's a Ph.D., and she's actually my wife. And on special times when I need support, she has on and off provided some support.
Q. What's her expertise?
A. She's a geoscientist.
Q. What is her title, do you remember?
A. I do not know what her title would be, but she's a scientist, Ph.D. She would be an external associate, if you wish. She's not a full-time employee.
Q. So she's not a senior hydrologist or a

project hydrologist?

A. I do not know for sure. She could be a senior scientist.

Q. How about senior staff hydrologist?

A. I don't know.

Q. So you don't know really as far as the folks that we've now discussed, four people, you don't know exactly what the billing records reflect their position to be specifically?

MS. O'LEARY: Object to foundation.

THE WITNESS: At present I do not.

BY MR. DEAN:

Q. Anybody else provide any additional support or work on Camp LeJeune that you haven't told me about that you remember as you sit there? I recognize you might have to look at some records, but we've talked Dr. Spilotopoulos and these other four.

Is there anybody else you haven't talked about that you remember?

A. There are others, but specifically the name of them I would not remember right now.

Q. How many employees today does Papadopulos & Associates have active?

A. Active I believe is 60 to 65.

Q. And are they all located in your offices located -- I believe it's Maryland, isn't it, the address, Rockville?
A. No. They are not all located in Rockville.
Q. Do you have another office somewhere?
A. Yes, we do.
Q. Where is it?
A. We have more than one.
Q. How many offices does S.S. Papadopulos & Associates have, and where are they located?
A. Well, we have one office in San Francisco. We have one office in Boulder, Colorado. We have one office in Waterloo, Canada. And I think that's it as offices are concerned. Some of our employees are basically remote, but those, I don't count those as offices.
Q. I understand. Do those offices, San Francisco, Boulder, Colorado or Waterloo, Canada, do they focus on any specific area or region of work?
A. The San Francisco office is more dealing with engineering and remediation type of issues, to my general knowledge, because I don't know everything. The same would be for the Waterloo,

Canada office. And the Boulder, Colorado office is dealing mostly with water issues.

Q. Let's go to your CV, and it's not -- it's the first document, your CV, behind Attachment A, like about a third of the way through.

MS. O'LEARY: Are you on Exhibit 3?

MR. DEAN: Exhibit 3.

MS. O'LEARY: If we have a stopping point sometime soon, we've been going for about an hour, can we stop soon?

MR. DEAN: Yep. Let me ask these next couple questions, and we'll stop.

BY MR. DEAN:

Q. Do you have your CV in front of you?

A. I have the CV attached to my report in front of me.

Q. I believe the CV, it was attached when the report was issued in December '24. My question to you is: Do you still believe that this CV is correct and complete, or is there anything you need to add to the CV?

MS. O'LEARY: Object to foundation.

THE WITNESS: Well, the CV is complete. It contains examples of what I have done, not everything I have ever done.

BY MR. DEAN:

Q. Understood.

A. As well as the CV is limited to deposition experience for the last four years or five years, whatever.

Q. That's what I was going to ask you on this question. Then we'll take a break. It is showing three depositions that you've been involved in over the last four years.

Has there been any others since December? Have you given a deposition since last December that this three would be incorrect?

A. Not since December.

Q. So the past four years, you've had three depositions. Have you provided some deposition or trial testimony before 2020?

A. Yes, I have.

Q. Do you remember approximately how many times?

A. Depositions or trial --

Q. Both.

A. -- testimony. To the best of my recollection, over my career, that would include whatever is in the CV, I testified in court either front of a judge or a magistrate about a dozen times. As far as depositions are concerned, the best of my recollection would be about three dozen times.

Q. Any trials since 2020?

A. No. It is not in my CV. I have no trials since 2020.

Q. I just wanted to to clarify and confirm.

MR. DEAN: We'll take a break right now if you'd like.

THE VIDEOGRAPHER: We are off the record at 1004.

(Recess from 10:04 a.m. to 10:15 a.m.)

THE VIDEOGRAPHER: We are on the record at 1015.

BY MR. DING:

Q. Let's jump to a little bit different new topic. We may jump around a little bit today. That's just how I roll. Okay?

What did you do to prepare for your deposition today?

A. Today basically nothing today. But to prepare for the deposition, I did prepare, of course, but not today. Yesterday and before that.

Q. Let's break it down. Who have you met with in the past 30 days to prepare for your deposition?

A. To prepare for my deposition I met yesterday with counsel, counsel who are present here today. And before that, we had conference calls, maybe two or three times, in which we did address some issues of deposition, but the conference calls were not uniquely on depositions. That is what I recall for the last 30 days.

Q. Since July or August of '22, since you started doing work in this specific case, other than the Department of Justice lawyers, have you met or had any phone conversations with any Marines, Navy personnel, NAVFAC personnel, other federal government agencies to find out information or to have a conversation about something that might be needed for your work?

A. Not that I can recall. Any such interaction would have been through counsel.

Q. So, for example, I know you were at the base in May of '24. It's, in your opinion, report and it shows some photos and there's a little date May of 2024. I'm using that simply as an example so you understand where I'm going with this.

I'm just trying to find out if you

interacted with any nonlawyers in the past two and a half years either, in person or by phone, about issues related to Camp LeJeune. Counsel might have been present. And I'm not asking what necessarily was discussed. I'm trying to find out if there was other individuals, nonlawyers, that might have been at the May '24 inspection or that you've had conversations with over the last couple years.

A. Counsel was always present during those visits, and there were people from the base that were there. And those people would be there to give us a tour and explain where we were and so on. They would occasionally answer questions that were asked.

Q. So can we agree on this, that at least over the past two years, you don't remember having any phone calls with any nonlawyers for any purpose related to this Camp LeJeune work?

A. There was no phone calls that would be with base personnel or so without the presence of a lawyer there.

Q. That's what trying to figure out. Have you had any phone conversations in the past two and a half years for which a nonlawyer was on the phone representing the base or any U.S. agencies and DOJ lawyers were also on the call? That was my question, if you remember.

A. I don't remember any.

Q. Now, those several times you were on the base, you've indicated that there were some base representatives, nonlawyers that were present that you my question interacted with; right?

A. That's correct.

Q. Do you remember who they were?

A. I do not remember who they were. I do not remember their names, perhaps with the exception of the one you mentioned before who I don't remember the name of right now.

Q. Scott Williams?

A. Scott Williams. Because he was there to basically provide a tour. Basically just the times I was at the base for this case, he was there for at least a part of it.

Q. Let's talk about these visits on base as far as locations that you went. I've only been on the base I think once, maybe twice, and I went to something referred to as the cages or a cage. It was a big warehouse and it had some documents in it, some boxes and boxes of documents. I'm using that as an example.

Where on the base have you generally been to to do anything related to your work at Camp LeJeune to the best of your recollection on those three visits?

A. To the best of my recollection, the visits all together included a thorough visit of a large portion of the base, where we were allowed to go because I believe that you may have sections of the base where you cannot go unless you have some clearance or something like that. That's what I recall. But we went to many places with basically a focus on the water treatment plant, the wells and issues that are basically of relevance to what I did.

Q. So those three times, and just use this as an example, you'd pull up to the gate. Someone would meet you there, maybe Scott Williams or others. You'd all get in a car and you've ridden around Hadnot Point in a car; right?

A. In a bus.

Q. In a bus? Car wasn't big enough for all the people; right?

A. At least on two visits.

Q. Rode around Hadnot Point observing

whatever it may be that you all were looking at; right?

A. We were just basically just performing a site visit, that's right.

Q. Do you remember getting off the bus to walk into a building to do any sort of an inspection or take measurements or do anything other than the water treatment plant?

A. We were doing site visits, and that included going into certain buildings.

Q. Do you remember which buildings you went into?

A. I do not remember the number of the buildings. Each building has a number. The only one I remember is where we went to eat.

Q. Where was that?

A. I think it was the officer compound.

Q. Do you know what Building 20 is?

A. Yes, I do.

Q. What is Building 20?

A. That's Hadnot Point water treatment plant.

Q. Do you know what the Building 900 series are?

A. Yes, I do.

Q. And have you been to the Building 900, 901, 902, 903 area?

A. For this litigation, I have been not been inside those buildings.

Q. Did you go in any buildings while you were there for those three occasions to look at documents or to see if you could locate information that might be helpful to your work in the case?

A. I recall that we went into the building you're describing, I believe, before where you have basically locked documents, boxes of documents. I recall we went into that building.

Q. Did you go through any boxes, look at any documents and pull anything out or flag anything for someone to provide to you?

A. No.

Q. Now, we'll get to it in a moment about your reference list, and there's quite a lot of materials listed that. I guess why I'm asking it now is the only way in which you've received information and documents -- let's confine it to documents in this case is from the Department of Justice and their counsel?

A. For documents, I believe that's correct, for documents related to the base.

Q. Did you have any historical documents that you had prior to July, August of '22, any old files or old working documents, maps, whatever it may be, reports that you might have used prior to '22 that you used and looked at in this case?

A. Well, my understanding is that all the documents that I had seen before for the base were included into what was basically available for this case.

Q. So if it's on your reference list, it's complete as far as you know as you sit here today?

A. What is on the reference list in my report is what supports my report.

Q. Do you have other documents in your files or old computers at S.S. Papadopulos that related to Camp LeJeune that you have referred to, reviewed or relied upon that are not listed?

MS. O'LEARY: Object to foundation.

THE WITNESS: I do not believe so as far as the way the question was phrased.

BY MR. DING:

Q. The reason I ask it was just simply to make sure you and I understand one another and that your reference and reliance materials, which we'll get to in a minute, that list is complete and there's not something that's not on that list that's back at your office or on a computer that you reviewed that was maybe in a historical file that you already had and it's something that you've reviewed or relied upon that also supports and it's just not listed. That's why I asked you the question. Okay?

MS. O'LEARY: Object to form.

THE WITNESS: I understand the question. And there is information that I collected after my report that we discussed previously that particularly is not in my report because it didn't exist at the time.

BY MR. DING:

Q. Understood. Agreed. That's your supplemental materials, which we'll get to in a moment.

Other than that, you're not aware of anything else historical in your files that you reviewed or relied upon that are not listed?

A. I cannot think of any documents that relate to the base.

Q. So what do you consider or how would you define your expertise as a professional?

A. That is described in my CV.

Q. Understand. Are you a fate and transport expert, groundwater expert, hydrologist? How would you classify your general area of expertise?

A. I am a geochemist. I have a hydrologist. I am a geologist. And in each of those disciplines, I have university degrees. That's basically what describes my education, if you wish.

Q. Your registrations and/or licenses are listed. There's two of them on your CV, geoscientist in Texas and a certified professional geological scientist for the American Institute for Professional Geologists; correct?

MS. O'LEARY: Object to foundation.

THE WITNESS: Licenses and certifications, I believe that's complete.

BY MR. DING:

Q. And that's complete. So, for example, you're not a professional engineer and hold a professional engineer's license?

A. I am not a professional engineer.

Q. Do you have you ever served on a peer-review committee?

A. Yes, I have.
Q. Are there any that you've served on that are related to any of the issues involved in this case related to water contamination?
A. It was related to water contamination.
Q. What was that generally just so we have identification?
A. For example, the one I am thinking and recalling right now was dealing with fuel issues and PCB issues at many sites.
Q. What sites were they? What was the project referred to or the papers?
A. It was an expert panel on that topic that dealt with groundwater contamination by fuel compounds as well as PCBs, and that was actually across the country along a pipeline that had basically stations. And most of the one where the issues were the most looked at, if you wish, was Pennsylvania. That's what I recall.
Q. Did it have another location more specific than Pennsylvania that it was referred to?
A. There would be many stations within Pennsylvania because the pipeline at the level of the entire country is basically, you know...

Q. Was that Hudson Valley?
A. That one was not Hudson Valley.
Q. Who was the committee that asked you to do the peer review for the one you're just referring to in Pennsylvania?
A. It was a panel that was doing actually peer review of what existed at the time as well as conducting some research for the panel.
Q. Did you do the report, do a report or is there anything that's publicly available about this peer review?
A. I do not know about publicly available. But there were several reports, and I was one of the contributors. I was not the only one on the panel.
Q. Is it listed in your CV?
A. I believe it's with one of the clients listed there in the paper.
Q. Who was the client involved in the one you're referring to in Pennsylvania?
A. At the time, I recall the client was Texas Eastern.
Q. Are you a member of the National Academy of Engineering?
A. I am not.

Q. Have you ever served on any editorial boards for any publications?
A. Not editorial boards.
Q. Now, remind me again when you first came to S.S. Papadopulos & Associates, the year approximately.
A. That was 1989.
Q. So you've spent pretty much the entirety of your professional career affiliated with S.S. Papadopulos & Associates; is that fair?
A. As a consultant, that's correct. And before that, I was in research more in the academic world, if you wish.
Q. Has all of your work for any issue going back as far as you can remember as far as compensation for services rendered by yourself been through S.S. Papadopulos? Let me tell you why I'm asking that.
Do you have any other entity that you own or affiliated with that has in the past done any work related to Camp LeJeune to your knowledge, or has it always been through S.S. Papadopulos & Associates?
MS. O'LEARY: Object to form.
THE WITNESS: It has always been through

S.S. Papadopulos & Associates and the Department of Justice.

BY MR. DING:

Q. So have you done -- let's use, for example, and we'll just talk 50,000 feet on the ATSDR water modeling and health studies at Camp LeJeune.

You know that there was a component of it that involved water modeling and then that water modeling component was then utilized on the health side to do some health studies.

MS. O'LEARY: Objection to foundation.

BY MR. DING:

Q. Correct?

A. That's my general understanding.

Q. Is this the first time you've done any work where you've looked at and reviewed and commented on the water modeling and how it may or may not impact activities on the health side, or is there some other projects you've have worked on in the past that are similar?

MS. O'LEARY: Object to form.

THE WITNESS: This case, this present case is the first time I was asked to evaluate the results of the ATSDR models both for Tawara

Terrace and Hadnot Point as far as the reliability of the estimated values to be quantitatively used for this case.

BY MR. DING:

Q. Have you over the past two and a half years rerun any water modeling computer programs to do any water modeling of Camp LeJeune other than what might be identified, disclosed in your report?

A. I have not.

Q. Do you know anybody at S.S. Papadopulos & Associates that's done any additional water modeling computer work related to Camp LeJeune at your direction or with your knowledge?

A. I know that Dr. Spilotopoulos has basically run the ATSDR model as part of his evaluation of the models. We have two models. He did that. I didn't do that.

Q. And do you have any comment about his work on that, or do you defer to him about his work and his opinions about it?

MS. O'LEARY: Object to form.

THE WITNESS: I have reviewed the model inputs and basically all the materials that are supporting the decisions or the assumptions that

ATSDR has brought into the model, especially because there is very little data to predict what happened 35 years ago, 35 years before 1985. And I have reviewed the parameters. I have compared the parameters in the models. I have done that because that's something I do as a geochemist.

BY MR. DING:

Q. Any comment or opinion about those reviews?

MS. O'LEARY: Object to form.

BY MR. DING:

Q. You personally or do you defer to Dr. Spiliotopoulos?

MS. O'LEARY: Object to form.

THE WITNESS: I have not run the models. He did. So I have no opinion or comment on that, but I have reviewed.

BY MR. DING:

Q. Understood. Have you ever, yourself, performed any historical reconstruction or hind casting using any sort of groundwater modeling tools to reconstruct historical mean monthly or concentration data?

MS. O'LEARY: Object to form.

THE WITNESS: Well, there have been

cases where a question like that will be asked. I remember one case where I did participate and that was to reconstruct basically some certain chemicals concentration, and that was based on estimates. And I recall having participated to that. And you had data and that was -- that's what I recall.

BY MR. DING:

Q. Do you remember the name of that project or the client or anything like that?

A. I don't remember the details or the client of that, but it was related to uranium mining.

Q. Uranium mining?

A. That's my recollection.

Q. And location?

A. I believe it was in New Mexico, that one.

Q. And timeframe, if you remember?

A. I don't remember the timeframe, but it was maybe 2000.

Q. As a result of that work, was a concentration -- reconstructed values calculated using that groundwater modeling work that you participated in?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: I was doing geochemistry in that, and I do not recall door if there was -- there was no complex monitoring done. It was, you know, more like -- if I recall, it was a very large pile of tailings, and the question was, all right, where does it go from the tailings.

BY MR. DING:

Q. So go back to my first question and understanding what you just testified to about.

Other than Camp LeJeune work, have you ever worked on any other project whose goal was to determine and measure human exposure or dose to toxins and contaminants?

A. Right now, I can not really remember specific ones, but as a geochemist, what my expertise is in is to understand the origin, fate and transport of contaminants in the environment. That's what I do basically. That's what I've been doing all my research years and professional years.

Q. Have you ever in history utilized and relied upon the ATSDR water modeling results to support any work you've done in any other case or any other project?

MS. O'LEARY: Object to form.

THE WITNESS: Could you repeat the question? I missed the first part.

BY MR. DING:

Q. Have you in any other historical activities prior to August of '22 ever utilized and relied upon the ATSDR water modeling chapters, conclusions and work to do work in some other matter?

A. In other cases and this case, the ATSDR models were used by others. I was not tasked to review the model. And I may have cited to what ATSDR has done at the time without having had done what I have done for the purpose of this particular case, which was to evaluate whether or not the values or the estimated values that ATSDR is presenting with the model could be quantitatively reliable to provide concentrations of the chemical of concern in this case over a long period of time.

Q. So go back to my question. My question -- I'll ask it a little different, because you seem to affirmatively say you've referred to it in the past and maybe cited to the report in some other work in the past.

Do you remember what occasions those were?

A. I would have to look at it. There was a case that I did work. I don't remember exactly the timing of it, but I believe it's called the Washington case or something like this. And I worked on that. Because it was related to contamination at Camp LeJeune, I probably referred to the ATSDR work. But I had not done a review that I conducted for this as far as reliability of the work for quantitative views of concentrations in the context of this project.

Q. We'll call it Washington, and we'll come back to it later in more detail. But you believe it's scientifically valid or you did at the time to cite to a -- cite to this ATSDR water modeling project or refer to it without ever having analyzed whether it was scientifically reliable at the time you relied on it?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: Me citing to it, if I did, doesn't mean that -- doesn't mean that -- doesn't explain what I have done to review it. I just

mention that it does exist.
BY MR. DING:
Q. But you believe in the context of an expert witness it's okay for you to cite to, refer to, rely upon the ATSDR water modeling in this prior activity without knowing whether or not at that time it was scientifically reliable?
MS. O'LEARY: Object to form and foundation.
THE WITNESS: It all depends what is the task and the purpose of the citation.
BY MR. DING:
Q. Well, did you at the time -- who retained you in the Washington case?
A. As I recall, it was the Department of Justice.
Q. Mr. Bain was your contact at that time?
A. Probably.
Q. Did you recommend in that case the need to analyze the model in order for you to provide a scientifically reliable opinion in the Washington case?
A. Without seeing the report to refresh my memory, I don't know.
Q. As you sit there -- I'll show you the

report later on -- you don't remember advising Mr. Bain at the Department of Justice the need for you to do a deep dive into analyzing the model at the time you were referring to it back then as best you remember right now?

A. Again, I will have to see the report.

(Hennet Exhibit 4 was marked.)

MR. DING: For the record, I've handed the witness Exhibit 4, which are the billing records, I believe it's around 42 pages or thereabouts, received a week and a half ago and I've also supplemented Exhibit 4 and added the additional bill we received last night for February of 2025, so the record is clear. Okay?

BY MR. DING:

Q. I understand, obviously, March is not over with, so the March bill, invoice, time records, those haven't been finalized; correct?

A. Yes.

Q. Now, a couple things I want to ask you about on these Exhibit 4 billing records. Take a look at the first page. In the top right-hand corner, it says the project name DOJ_CL_2022.

Do you see that?

A. I see that.

Q. And that's what you referred to as the project name for your and the S.S. Papadopulos work on the Camp LeJeune litigation since '22?
A. That's an internal name.
Q. Project number is 1817. And then it refers to a PO number. What does that mean? What does PO number mean?
A. I guess it's a project order number. This number is probably from the DOJ. I do not do admin. So that's what I would guess.
Q. Is it a purchase order number?
A. I believe that would be right, yes.
Q. Is there a document that's referred to as a purchase order that's got this number on it somewhere that ends in 502?
A. Personally I don't know, but it must be because it is written here.
Q. And did you gather that document and provide it to the Department of Justice?
A. If it comes from the Department of Justice, I must have it. Personally, I do not to admin.
Q. So you didn't and you don't believe admin sent that purchase order over to the Department of Justice in response to the subpoena?

MS. O'LEARY: Object to foundation.
BY MR. DING:
Q. Because you assumed they already had it?
MS. O'LEARY: Object to foundation.
THE WITNESS: I do not know.
BY MR. DING:
Q. Under the comments on the left side there a little further down, it says DJ File Number. What does DJ stand for?
A. I am not sure. I do not know. Again, it is admin.
Q. Then it says DOJ contract #2W-CIV-03-0513. Do you see that?
A. I see that.
Q. Is there a written contract of some sort that that contract number is referred to that's in possession of you or S.S. Papadopulos & Associates' records?
A. Probably.
Q. Did you gather that contract and provide it in response to the subpoena and provide that contract to the Department of Justice to produce to me?
A. My understanding is if it's contract with the Department of Justice as you describe it,

the Department of Justice has it.

Q. Again, I agree with you. You didn't, however, in response to the subpoena supply that document to the Department of Justice because you assumed they had it and would produce it if needed?

MS. O'LEARY: Object to foundation.

BY MR. DING:

Q. Is that fair?

A. That would have been through admin, and I don't do admin.

Q. Now, if we look down below this on the first page -- and if you want to, you can glance through -- we'll look at a few pages together. How about we just do it that way.

Do you see it says Professional Services, and under Employee Type there's some positions, for example, senior principal, but there's no names, specific names?

A. I see that.

Q. And you told me earlier, as best you know, you're the only senior principal. So when it refers to senior principal, that would be Dr. Hennet?

A. That's my understanding, yes.

Q. And it says two hours. We don't know what you did for two hours looking at this document, but you did key in on a computer, timekeeping computer program what you did for those two hours?

MS. O'LEARY: Object to foundation.

THE WITNESS: Well, maybe, maybe not, because it's not done always the same way. And my recollections is our accounting system or the way we enter time has been basically changed or upgraded. It appears to be upgraded relatively frequently. So I don't remember the situation then.

BY MR. DING:

Q. Does Papadopulos & Associates send this one-page invoice that you see on Exhibit 4, that first page, because the second page is for a different month. Do you see that? The one on the back of the first page is a different month. So the one ending 9/21/22 is just a single page ending in Bates-stamp CLJA_SSPA_INVOICES_1. Do you see that?

A. You have to help me here.

Q. Do you see that the invoice is a single page for the Bates-stamp that I provided?

MS. O'LEARY: You're on the first page of Exhibit 4?

MR. DING: Yes.

BY MR. DING:

Q. Exhibit 4, page one is a single-page invoice?

MS. O'LEARY: Object to foundation.

THE WITNESS: This is a single-page document.

BY MR. DING:

Q. Is that for the month -- it's dated 9/21 and it says it's for services rendered through August 31, 2022. Do you see that?

A. I see that in the middle there, yes.

Q. And this is the first invoice you and I are looking at that I have; correct?

MS. O'LEARY: Object to foundation.

THE WITNESS: I will take your word for it.

BY MR. DING:

Q. Do you know whether or not when this invoice -- it says it's being -- the client and the address there at the top left is Branch Chief, Finance and Accounting under U.S. Department of Justice. Do you see that, and an address, PO box?

A. I can read that, yes.
Q. Is this one-page invoice the only thing that is sent to the Department of Justice for payment of this invoice, or does it have attachments when it goes that itemizes the time that's shown on the summary?
A. I don't know.
Q. Who would know that?
A. Admin.
Q. The Department of Justice receiving this invoice would also know that, wouldn't they?
A. I don't know.
MS. O'LEARY: Object to foundation.
BY MR. DING:
Q. Do you understand it's your obligation as an expert as part of the federal rules to specifically provide open and complete information about your billing in a case like this? Are you aware of that?
MS. O'LEARY: Object to form and foundation.
THE WITNESS: This is administrative.
BY MR. DING:
Q. I'm asking you are you familiar with what's called Rule 26 and an expert's obligation

to provide open and detailed billing records in
litigation?
MS. O'LEARY: Object to form and
foundation.
BY MR. DING:
Q. Are you aware of that?
A. I am generally aware of Rule 26, but
specifically -- but, you know, my firm gets a
contract with the Department of Justice. I don't
do the billing. So I don't know if it has one
page, two pages or 20 pages. I do not know that.
Q. Would you agree with me it's your
obligation, all experts' obligations to provide as
much detail and all information about their
compensation and billing to the opposing side in
response to what we refer to and you refer to as
Rule 26?
MS. O'LEARY: Object to foundation.
THE WITNESS: I do not know. We do
abide by everything because when you work with the
Department of Justice, you have to abide by
everything, and we do.
BY MR. DING:
Q. Now, if you look through these invoices
or this one page, it says the initial budget at

the bottom left-hand corner was $100,000.

Do you see that?

A. I do.

Q. And then if you flip through it to the invoice that's Bates-stamped page 6, so there will be a 6 at the end of the page, do you see that the behind casting changed 611,664? Do you see that?

A. Where is it on the page?

Q. Bottom left, Project Summary.

A. Yes. I do see that.

Q. Do you remember and can you tell me why it went from a $100,000 budget to a budget of $611,664?

A. I don't recall the details of it, but this is typical of a project like this. The first phase is to evaluate, to do a first evaluation of an understanding what the cases is about, do a first evaluation of certain aspect of it. And I am typically required or requested, if you wish, to provide an estimate of how much it would cost to provide services.

And I do a best estimate by saying I would need a team to do this because I cannot do it all by myself. It's too many documents, too much to do. And then I provide my best estimate of how much it would cost.

Q. To do XYZ?

A. To do the project up to a certain -- typically it's what will it cost for a year, for example.

Q. Is there a document that you use to provide that estimate? Is it called a budget, or is it called something else?

A. It is my budget estimate, and that's what my budget estimate is and I believe --

Q. How do you transmit that budget estimate to the Department of Justice for approval? Is it a letter? Is it email? Is it a report? Is it a budget? What do you remember refer to it as?

A. I do not recall about this one in particular. I do not recall how it was that. But obviously, it was transmitted to the DOJ whether by phone or by -- in some manner. Again, I do the budget estimate.

Q. I think we've got enough here on this issue. Then I'll move on. You don't remember specifically the mode of the transfer of the information, whether it went from accounting, whether was a formal budget document, an email or a phone call, to provide the budget estimate of

$611,664?

A. I do not know the detail for this particular thing, but there is an estimate somewhere. And I am typically the one who would do such an estimate.

Q. And does the process work you send the estimate over to the Department of Justice and they approve or sign off on it and then you proceed with whatever work that's been authorized?

A. It's a budget request, and it is evaluated. And then if it was approved, we probably get a green light that it is approved. And then we'll probably have a meeting to explain what we thought should be done. And that's the way it works for most cases like this.

Q. Now, turn to page 19.

A. By that you mean the Bates number?

Q. Yes, sir. Do you see at the bottom of the Bates-stamped page 19 the budget under Project Summary on the left at the bottom says $611,664?

A. I see that.

Q. Turn to the next page, 20. And does it reflect that the budget is changed between November and December of '23 to a budget an approved budget of the $1,216,284?

A. I see that.
Q. If you turn to page 25, Bates-stamped page 25, bottom left has that budget now in March of '24 increased to $1,466,224?
A. I see that.
MS. O'LEARY: Object to foundation.
BY MR. DING:
Q. If you flip to page 33 or Bates-stamped page 33. Let me know when you're there.
A. I see that, yes.
Q. Under the Project Summary, column left has the budget now increased in September of $1,716,284?
A. I see that.
Q. If you turn to the top of page Bates-stamp page 37, on December 23, 2024, do you see under the column Budget on page 37 or Bates-stamped 37, the budget has increased to $1,966,284?
MS. O'LEARY: Object to foundation.
THE WITNESS: I see that.
BY MR. DING:
Q. And that was approved by the Department of Justice at some point in time; right?
A. I suppose so.

Q. If you turn to be Bates-stamped page 40.
A. I am there.
Q. On January 17, 2025, invoice No. 27034 at the top of the page Bates-stamp 40, did the budget increase to 2,216,275.50?
A. I see that.
Q. And if you turn to the supplemental Bates-stamp and Allison, I don't know how you want me to refer to it. I made it as one exhibit. I don't know if you're going to Bates-stamp it 43.
MS. O'LEARY: Can you refer to it by the invoice number at the top?
MR. DING: I can do that.
BY MR. DING:
Q. The last page of Exhibit 4, the invoices, I received last night invoices 27513, and it's dated March 19, 2025. Do you see that on the first page?
A. I see that. That's a loose page.
Q. Yes, sir.
A. It's not bound with Exhibit 4.
Q. Well, it is part of Exhibit 4 for the record. I made it a part of it. It just doesn't have a Bates-stamp because Ms. O'Leary just provided it to me last night.

MR. DING: We'll supplement it with the correct Bates-stamp once we get it. We'll supplement with Exhibit 4, if that's fair.
MS. O'LEARY: That seems fine.
BY MR. DING:
Q. On the back of invoice 27513, it still reflects a budget of 2,216,275.50.
Do you see that?
A. I do see that.
Q. And it says that the budget remaining is only $171,667.59. Do you see that?
A. I see that.
Q. And this does not account for the work done in March by you, Mr. Spilotopoulos and any others that might have been working in March. That will come out of that remaining budget once we get the next invoice; right?
A. That's my understanding.
Q. So my question to you to end this area of the deposition is: Have you prepared a budget estimate and provided it to the Department of Justice to provide for additional funding and/or budget for your work after this month?
A. I've not done so because we still have money.

Q. Have you had any discussions with anyone about the needs for a future budget approval moving forward from today if this budget is used up this month?
A. I have not talked to anyone about that.
Q. And you've not prepared anything about that?
A. I have not prepared anything about that.
(Hennet Exhibit 5 was marked.)
BY MR. DING:
Q. I hand you what I marked as Exhibit 5, and I'll tell you this for the record. Exhibit 5 I had to print it on larger paper so you and I -- with my advanced age, I couldn't see it on eight and a half by 11. So I had to print it on larger paper. Okay?
Are you familiar with a website known as USASpending.gov maintained by the federal government of the United States of America?
A. I am not.
Q. Do you see on Exhibit 5, the first page at the very top it says Active Filters. It says EPA -- it identifies the recipient as S.S. Papadopulos & Associates, Inc. Do you see that?
A. I see that.

Q. And then down in the center, it gives you a prime award ID number, and there's about, I don't know, six or eight listed there. And out beside that is the recipient's name, S.S. Papadopulos & Associates. And then the obligations are listed there in dollars and cents. Do you see that column?
A. I see that column.
Q. Then there's some tabs you can click on. It talks about contract IDDs, grants, direct payments, loans and other.
Do you see those other tabs?
A. No, I did not.
Q. Although they're hidden, you see the little tabs beside the contracts?
A. Okay. Right on top there, yes.
Q. If you turn to the second page on this USASpending.gov federal government website, do you see the awarding agency in the topic left-hand corner, it says Department of Defense and recipients is S.S. Papadopulos & Associates? Do you see that?
A. I see that.
Q. Do you see the purchase order referenced there is just above that is listed as

W912DW11P0056? Do you see that?
A. I see that.
Q. And over on the right corner of that first block, do you see the start date of that contract was February 16, 2011?
A. I see that.
Q. And this was for $40,000. Do you see that?
A. Where is that?
Q. In the center there it says Current Award Amount. Do you see that, $40,000 potential award amount?
A. I see that.
Q. And if you keep going down under the Award History, you see Action Date of 2/24/11. Amount is 40,000. To the right of that, it says Transaction Description: MODFLOW Model Recalibration.
A. I see that.
Q. Do you know what this work was for for the Department of Defense that's being referred to there in 2011?
A. I do not. I had nothing to do with this.
Q. Do you know what location someone at

S.S. Papadopulos was working on in order to do some MODFLOW model recalibration work?
A. I do not.
Q. Turn to the next page of Exhibit 5, third page I think it is. Do you see the top left-hand corner there's a new purchase order number listed there of W912DW09P0253? Do you see that?
A. I see that.
Q. And the awarding agency is the Department of Defense. Do you see that?
A. I see that.
Q. The start date of the project was September 18, 2009.
A. I see that.
Q. The amount that was obligated or potential award amount was $66,500. Do you see that?
A. I see that.
Q. By the way, if you go back to the top out to the right, far right of the purchase order number, does it show the word "Completed"?
A. I see that.
Q. Now, if you go to the section under the Award History, do you see the Action Date, the

first one listed there of 9/18/2009 for 22,000?

A. I see that.

Q. To put in context just for dates, Tawara Terrace report by ATSDR was released in 2007; correct?

A. I believe it's correct.

Q. And the National Academy of Science released an alleged review of that report in July, I believe, or August of 2009. Do you remember that? I'm not going to hold you to the specific date. But the National Academy of Science released an alleged review of the ATSDR report in the summer of 2009.

MS. O'LEARY: Object to form.

THE WITNESS: I will take your word for it.

BY MR. DING:

Q. Do you see -- who is Howard Hanson? Excuse me. Not who. Where is Howard Hanson Dam?

A. Howard Hanson? Where is that?

Q. In the center of the webpage or the document, out beside 9/18/2009 and 22,000, it says groundwater model. Independent technical review, ITR, right the abutment integrity, Howard Hanson Dam. Do you see that?

A. I see that.

Q. Do you know what that's referring to and were you involved?

A. I was not involved.

Q. And you don't know what it's referring to?

A. I do not know what it is referring to.

Q. Turn to the next page. I guess we're now on page 4; right?

A. You are right.

Q. Do you see the purchase order at the top is 15JCIV22P502?

A. I see that.

Q. And out to the right, it says in progress. 9 months remaining.

A. It says "Nine months remain."

Q. Excuse me. "Nine months remain." Do you see that?

A. I see that.

Q. And it shows the start date of this contract with the Department of Justice as the awarding agency was July 21, 2022.

Do you see that, top right-hand corner?

A. I see that.

Q. Now, that purchase order number ending in 502, would you go back and look at Exhibit 4 and tell me if that's not the exact same purchase order in your very first invoice number 1?

On exhibit, 4 Bates-stamped first page 1, up in the topic right-hand corner, it says PO Number. That is the exact same number I just read you to ending in 502 that is on page 4 of Exhibit 5; is it not?

A. Both numbers or whatever codes are the same.

Q. Thank you. Now, does it show in this Award Amounts that the obligated amount currently is 2.2 million? Do you see that?

MS. O'LEARY: Are we back on Exhibit 5?

MR. DING: I'm sorry. Exhibit 5.

BY MR. DING:

Q. Back on Exhibit 5 on page 4, the Department of Justice purchase order page, does it show that the current award amount is the 2.2 million?

A. Yes. I see that.

Q. And that number under Potential Award Amount several lines down, do you see it's 2,216,275.50, and that's consistent with the very last page of invoices that we reviewed from

Exhibit 4. The March invoice I received last night has the same number. Do you agree with that?

MS. O'LEARY: Object to form, just to clarify what you mean by March and February.

MR. DING: The March I received last night dated March 19, 2025.

THE WITNESS: I see that. Those numbers are the same.

BY MR. DING:

Q. Now, under the Award History --

A. By the way, when we are done with this, I would like to take a break.

Q. Yes, sir, no problem. We'll be there very soon.

Under the Award History, you see that first entry modification, it says zero at the first line there. And then it's got an Action Date 7/21/2022 and $100,000. Are you with me?

A. I'm with you.

Q. Then there's a modification number. The first one says P1. If you look under it, there's additional P1, P2, 3, 4, P5 and 6. Do you see that?

A. I do see that.

Q. Now, if you scroll over to the right under Action Type, does it say Change Order out beside the one that says P1?

A. It says that D column Change Order.

Q. Is the change order the estimation document you referred to earlier that's sent over Department of Justice to get approval for additional work, or is that a different document?

MS. O'LEARY: Object to foundation.

A. I believe it must be similar or the same. I don't know.

Q. Who would know that? Someone in your office, admin, or the Department of Justice?

A. I personally do not know if this is what you say it is or not.

Q. Turn to the next page. If you want to take a break now and then come back to the exhibit, that's fine with me. I may have more than five minutes left on these last two pages.

A. Take a break now.

Q. That's fine. Go off the record.

A. Coffee is working.

Q. Yes, sir. Understood.

THE VIDEOGRAPHER: We are off the record at 1123.

(Recess from 11:23 a.m. to 11:32 a.m.)

THE VIDEOGRAPHER: We are on the record at 1132.

BY MR. DEAN:

Q. Dr. Hennet, we've been going for about a couple hours, a little over two hours. We had a couple breaks during the day.

Have you discussed -- had any discussions with the Department of Justice lawyers at all?

A. We just chatted on things that have nothing to do with the deposition.

Q. Thank you. Now, if you turn to, for the record, page 5, the last two pages -- this is a six-page document -- the last two pages, 5 and 6, do you see recipient is identified at the top as Papadopulos & Associates, Inc.?

A. I'm confused about what is 6 because the last two pages or double sided.

Q. Yes, sir.

A. And you say the last two. So is this one or this one?

Q. I'm sorry. Good point. We'll just stay on that page 5 for right now. Do you see on page 5 at the top it says Recipient under the Active

Filter is S.S. Papadopulos & Associates do you see that?

A. I see that.

Q. And do you see that in the center of the page there, and it's the tap that's opened says Contracts, and then it says Prime Award ID under that?

A. I see that.

Q. And you see from there all the way to the bottom of page 5, there's a list of different award IDs for different contracts, and out beside that is S.S. Papadopulos & Associates and an obligated amount? Do you see that?

A. It says Obligations.

Q. Thank you. It says obligations and then under that is Amounts; right?

A. I see that.

Q. If you turn to page 6, the next page, the contracts continue with the same information we had on page 5. Do you see that?

A. It appears to be a continuation of page 5.

Q. If you go to page 7, do you see the same where it lists the awarding agency as the Department of Justice, the recipient, S.S.

Papadopulos & Associates up at that top as far as active filters? Do you see that?

A. I see that.

Q. And on page 7 you see a list of awards, prime awards for contracts with the Department of Justice with the recipient S.S. Papadopulos & Associates, and then there's an amount over in the Obligations section next to each one of those contracts? Do you see that?

A. Yes. To make sure, page 7 is the one before the last?

Q. Yes, sir. As a matter of fact, the very first one listed there is that same one that we're here about, which is our case, the award ID is identified as 15JCIV22P502, which is the name number you and I have looked at on the invoices for your work on this litigation; right?

A. It appears to be the same number, yes.

Q. And the obligated amount are lining up as the $2,216,275.50; right?

A. That to my recollection is the same amount, yes.

(Hennet Exhibit 6 was marked.)

BY MR. DEAN:

Q. Now, I'll show you what I've marked as

Exhibit 6. For the record, Exhibit 6 is an Excel spreadsheet created by my office after clicking on all of those contracts on all of pages that you and I just went the over on Exhibit 5, and if you see I've added the award ID number at the top. I've added the column for Total Obligated Amount. I've added the Award Date that's listed in the government's database on USASpending.gov. I've added the Period of Performance start date column and the end date, the Awarding Agency and the Funding Agency, and they're all listed as Papadopulos & Associates.

Do you see that Excel spreadsheet that I created?

A. I see the Excel spreadsheet. I didn't really follow everything you said.

Q. I understand. I'm just laying what lawyers call a foundation so understand where this document came from. I created it based on the information that's on the website for the USASpending.gov.

Do you see that?

A. Right here I have no possibility to check that.

Q. I understand that. I'm representing to you that the information on Exhibit 6 came from the information on the website shown on Exhibit 5. Okay?

A. Okay.

Q. Now, do you remember me asking you about when you started doing work on this case? Excuse me.

Do you remember me asking you about when you started doing any work associated with Camp LeJeune?

A. I believe you asked me a question like that.

Q. And you told me something along the lines you couldn't remember the exact date, but it was sometime you thought in 2005.

A. Approximately, yes.

Q. If you look at the second entry there, do you see the one that ends in 66 in the first yellow mark, Obligated Amount was $45,634.10 and it said the period of performance start date was 11/30/2005 and that the awarding agency is the Department of Justice?

A. I see that.

Q. And does that sort of refresh your recollection about the approximate timeframe of starting to do work with Papadopulos & Associates at Camp LeJeune somewhere in November of 2005?

MS. O'LEARY: Object to foundation.

THE WITNESS: I have no clue if this represents work done at Camp LeJeune or not.

(Questions on Exhibt 7 bound separately.)

BY MR. DEAN:

Q. Now, going back to Exhibit 6, the Excel spreadsheet that I prepared and that first one first yellow entry that you and I were just talking about, does that now refresh your recollection that the $45,634.10 under that award ID DJJ6WENR010066, showing the awarding agency Department of Justice and the recipient as S.S. Papadopulos & Associates is the project for which you first began working at Camp LeJeune in November 2005 more likely than not?

MS. O'LEARY: Object to foundation.

THE WITNESS: I don't know. It could be. I don't know.

BY MR. DEAN:

Q. Fine. If we go down, and I'm not going to go into every single one of these, but do you see a number of entries between 2005 and all the way on the backside -- if you turn it over, you'll see more entries that go through -- the last one is listed as ending in 49 for $494,846 for some work for the EPA with a start date of 9/30/2024? Do you see that?

A. I see that.

Q. And if you total up -- before we go there, the one for the Department of Justice that we've been talking about, the last invoice page number, Exhibit 4, remember we talked about there was a $2,200,000 budget and we had used up about 1.9, and there was 178,000 or thereabouts left over. Do you remember that?
A. I remember that if that's what you are talking about, the last page of Exhibit 4.
Q. If you turn over to page 2 of my Exhibit 6, about the sixth entry there is where the 15JCIV22P502 purchase order is listed and it's got that amount we've been talking about, 2,216,275.50. Do you see that?
A. I see that.
Q. The $2,216,275.50 is money that Department of Justice has paid your firm or is obligated potentially with a budget from July of '22 to present?
A. That's my understanding.
Q. However, we know that the Department of Justice and yourself started doing some work at Camp LeJeune, like we've already discussed, beginning in 2005; right?
A. Yes. Whether it began in 2005, about.

Q. Not a specific date. There are amounts there for the Department of Justice listed for contracts, 45,634. We can go to the next one. It says 40,000. It was 2007 work. Skip the next one, it was EPA, and we go to some work that was done for the Department of Justice in February of 2009. That had a $440,096 payment, do you see that, or obligation?

MS. O'LEARY: Object to foundation.

THE WITNESS: I see that.

BY MR. DEAN:

Q. So the point I'm making, and you'll probably agree now that we've gone through this, the amount the Department of Justice has paid Papadopulos & Associates for all of its work at Camp LeJeune since 2005 is an amount in excess of the current obligated $2,216,275.50. Can we agree on that?

A. I do not agree in the sense that not at all of the Department of Justice cases we're talking about here have to do with Camp LeJeune.

Q. I don't disagree with that. But some of these invoices and contracts, were they to be produced, would show us, for example that very first one, the 45,634.10 for the November 2005 work, it would show some of these that would be work at Camp LeJeune more likely than not; correct?

MS. O'LEARY: Object to foundation.

THE WITNESS: I don't know. I don't to admin, but probably.

BY MR. DEAN:

Q. Now, if you turn to the second page, just to finish up this line of questions, do you see that all of the total obligated contracts that are listed on my exhibit that I received the information from USASpending.gov, part of the federal government's website, shows that of all of these agencies, Department of Justice, the EPA, General Services Admission, Department of Energy, are currently or in the past with a potential total value of awards to your company of $137,244,621.84 if my math is correct in column 3 on the second page?

MS. O'LEARY: Object to foundation.

THE WITNESS: If your interpretation is correct. My understanding is that does include -- most of those are not litigation projects. I am not involved, but I know that we work for the Hanford site, for example. And I know that we work for EPA Region V. I am not involved. I know that we do work for the government.

And over the yours, it has been maybe in the 10, 15 percent of the business that my company performs service for. I personally am only involved in a subset of those, and that would be through the Department of Justice.

BY MR. DEAN:

Q. So let me finish this up with this question. The total amount that's paid out for all of those various contracts that you just mentioned that has a potential subtotal award of $137,244.621.84, as a shareholder, you would financially benefit at some potential percentage, whatever your share interest is, with whatever those government contracts are that are paid by these different agencies, including the Department of Justice?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. Whether you were involved that the project or not, you would personally financially benefit from all these projects; correct?

MS. O'LEARY: Same objection.

THE WITNESS: If the company does well,

I do well as well. Like every employee, we all participate. But I want to make one correction here. A potential award is not the same as basically what was actually done.

BY MR. DEAN:

Q. Understood.

A. And I'm not finished. And the potential award sometimes in some of those projects, not the one that I have been involved in, includes subcontracts that can be substantial because -- that's all I can say about that because I don't know the details of all of those contracts.

(Hennet Exhibit 8 was marked.)

BY MR. DEAN:

Q. Understood. I'm going to show you Exhibit 8. I'm going to represent to you this is the metadata from the billing production in this case from you, and you see it indicates there the Bates number is CLJA_SSPA_INVOICES_1 through 42. Do you see that?

A. At the bottom there I see that.

Q. You see the file name for this particular file was named by somebody 1817 invoices through 11125 without backup.pdf.

Do you see that.

A. I see that that.
Q. What does backup mean?
MS. O'LEARY: Object to foundation.
THE WITNESS: I don't want to speculate, but it seems that -- I don't know what it means. It may be reflecting some notes. For example, if I enter -- today I will enter in my time sheet eight hours, whatever it is, and say deposition or something like that.
BY MR. DEAN:
Q. You're not a computer person nor admin person at the office, but someone would have those backup records indicating what work was being done and when that serve to create those invoices that I previously showed you?
A. I suppose so, yes.
(Hennet Exhibit 9 was marked.)
BY MR. DEAN:
Q. I'm going to show you Exhibit 9. Exhibit 9, you see that it's a January 2010 publication from the United States Department of Justice, Executive Office for Attorneys. Further down, it appears to be some sort of a bulletin, United States Attorneys bulletins of some sort.
Do you see that?

MS. O'LEARY: Object to foundation.
THE WITNESS: I don't know of some sort, what you mean by that.
BY MR. DEAN:
Q. Can we agree at least on the left-hand side, it says January 10, Volume 58, Number 1, under that United States Department of Justice Executive Office for the United States Attorneys, Washington, D.C., H. Marshall Jarrett, Director. Then under it says, "Contributors' opinions and statements should not be considered an endorsement by EOUSA of any policy, program or service. The United States Attorneys' Bulletin is Published Pursuant to 28 CFR Section 0.22(b)."
Do you see that?
A. I see that.
Q. Then at the top of the document, page 1, it says Expert Witnesses. Do you see that?
A. Yes.
Q. The first one says, "Considering the proposed changes to Federal Rules of Civil Procedure regarding expert witness discovery by Adam Bain."
Do you see that?
A. I see that.

Q. Then under that it says, "Working With Lawyers: The Expert Witness Perspective, by Remy J.C. Hennet, Ph.D."

Do you see that?

A. I see that.

Q. Did you participate and work at some point in time to prepare a journal article for the Department of Justice back in 2010 by that name?

A. Yes. I recall it was an invited paper, and it was invited to be included in there. I don't remember exactly the detail of it. I will have to read it.

Q. Do you see that on page 5 -- it's a black and white document, but you can see there's some highlights that's been added to the document.

Do you see that in the center about Rule 26 trial preparation, protection for communications it party's attorney and expert witnesses?

So you see that section?

MS. O'LEARY: Just for the record, you're referring to the graying as highlighting?

MR. DEAN: Yes, ma'am.

BY MR. DEAN:

Q. Do you see that grayed area?

A. I see some gray area, but I've not read it yet.

Q. I'll read it with you and read it for you. It says, "Rules 26(b)(3)(A) and (B) protect communications between a party's attorney and any witnesses required to provide a report under 26(a)(2)(B) regardless of the form of the communications, except to the extent that the communications (i) relate to compensation for the expert's study or testimony."

Do you see that?

A. I can read that, yes.

Q. Now, if you turn to your section which begins about page 14 of the document. Down at the bottom left-hand corner are the page numbers. Do you see that?

A. I do see that.

Q. Is this the section that you wrote, which is about four pages long in January 2010 published in this bulletin?

A. I take your word for it. I mean, I know I did contribute to this. I don't see -- I have not read it for more than 10 years I am sure. So I don't recall exactly what is in it, but it appears to be what I contributed upon an invitation to contribute.

Q. And do you say in the first full paragraph on page 16, "The expert witness is often publicly stigmatized as ethically comprised considered by some as nothing more than hired gun"?

Did I read that correctly?

A. You read that correctly.

Q. It goes on it says, "The stigma is borne from misconceptions and from unavoidable human nature. The concept that anyone who charges which high hourly rates would say anything to satisfy the paying party along with a few well publicized examples of professional misconduct server to anchor the stigma. In reality, the enduring expert witness must demonstrate strong professional and ethical conduct."

Did I read that correctly?

A. You did.

Q. Do you see at the next to last sentence at the bottom, it says, "Opinions of the court and transcripts of depositions and trial testimony constitute a public record. That record serves as an effective quality control tool that lawyers and the finders of fact can consult. To succeed as an expert witness, credibility and thoroughness have to complement education and experience."

Did I read that correctly?

A. You did.

Q. If you turn to page 17, the next page, and this is last page of your section, does it say, "First, for expert testimony, it is important to," and you listed a bullet point of a number of things there, do you remember?

Do you see that?

A. I don't remember, but I see that.

Q. And then you've got, "Second, for a successful lawyer-expert relationship, is important for the expert to." And can you read into record the last bullet point that you wrote?

MS. O'LEARY: Object to foundation.

THE WITNESS: The blast bullet point reads, "Keep track of the budget since it can be a limiting factor."

BY MR. DEAN:

Q. What did you mean by that?

A. It is important for what I do as a professional to make sure that the client is aware of the degree of effort and cost of a project. So it is important to follow how much money is being billed. And some projects may have -- when you have a budget, you have a budget. And if you go above budget, you may not be paid.

Q. But you do believe and you wrote in your article that it's important in order to maintain your integrity as an expert witness that you're thorough and provide truthful accurate information in those situations?

MS. O'LEARY: Object to foundation.

THE WITNESS: Yes. As an expert witness, I just follow those ethical rules and answer to the best of my recollections and ability. I am doing that here.

(Hennet Exhibit 10 was marked.)

BY MR. DEAN:

Q. I'll show you what I'll mark -- I'll show you Exhibit No. 10. And we're going to use the TV in just a second and try to get through this, if we can, by lunch. I don't know. We'll see if we can. We're going to turn now to your reliance materials list and supplemental materials that you provided to the Department of Justice to produce in this case in the last few weeks. Okay?

A. Let's see.

Q. I'm going to show you Exhibit No. 10.

MS. O'LEARY: Is all of this 10? There's several loose papers.

MR. DEAN: Yeah. I was going to make it all one exhibit. I'll go through and identify just so it's clear on the record what we're doing.

BY MR. DEAN:

Q. Do you see there's a cover letter from Ms. O'Leary, dated February 25, 2025. I'll read into the record what it says. It says, "Counsel, pursuant to Federal Rule of Civil Production Number No. 26(e)(1) & (2), the United States now produces supplemental facts and data considered or relied upon by Dr. Hennet."

Do you see that?

A. I see that.

Q. Now, do you agree with her, this is the way she wrote the letter, that these are new facts and new data that was considered by you after your report?

MS. O'LEARY: Object to foundation.

THE WITNESS: I believe it relates to what I did on February 11.

BY MR. DEAN:

Q. Which is after your original report in December of 2024?

A. That was after my expert report, yes.

Q. And then the second part of Exhibit 10 is an errata sheet -- actually, it's a couple pages -- that relates to some updates, changes or corrections that you wanted to make to your report footnotes.

Do you see that?

MS. O'LEARY: Object to foundation. I have two pages of errata. Am I meant to have two?

MR. DEAN: I agree with that, one on the 25th and one on the 28th.

BY MR. DEAN:

Q. Do you have the errata sheets there?

A. I have Exhibit 10.

Q. Hand it back to me, and I'll see if I can help find where it's at in the group here. At the end there's two pages. So there's three sections to this. Exhibit 10, first page, one and two are two letters, February 25 and 28. The second section of Exhibit 10 is your supplemental reliance materials list that came with these letters. The last thing is the errata sheets, two pages of errata sheets that came with the letter on the 28th.

MS. O'LEARY: I object to foundation

there. I don't think both errata came with the letter, either letter from February.

MR. DEAN: What's that?

MS. O'LEARY: I don't think both errata came with the letters from February.

BY MR. DEAN:

Q. If you look on the backside of the first page there, you'll see a second letter, dated February 28, and then the last sentence says, "Also produced are errata correcting citations to Bates-stamped documents with the prefix."

Do you see that?

A. Which date of which letter because I don't know which page -- the second page.

Q. Yes.

A. February 28, 2025.

Q. Does it say in the second sentence, "Also produced are errata correcting citations to Bates stamps"?

MS. O'LEARY: Object to foundation.

THE WITNESS: Bates-stamp documents with the prefix.

BY MR. DEAN:

Q. Errata sheets.

A. So it's not full sentence you gave. But

I can see what you say.

Q. And do you see at the end of Exhibit 10, the last two pages of Exhibit 10 are those two errata pages?

MS. O'LEARY: Object to foundation.

THE WITNESS: The last -- you have one page that is two sides and one page that is one side.

BY MR. DEAN:

Q. Agreed.

A. And it is a three pages or four depending on how you look at it.

Q. But those are errata sheets that you created subsequent to your report to make some minor changes to some references in footnotes; right?

A. Appears to be, yes. It appears to be that.

Q. Now, the other section of Exhibit 10 that I want to spend most of the time with you is it titled Supplemental and Corrective Reliance List. Do you see that?

A. I see that.

Q. Did you prepare this document or someone work with you to prepare the supplemental corrective reliance list?

A. My recollection is that it was -- I delegated this could be done by a staff to basically get those things with the errata incorporated. That's my recollection.

Q. And it also was to list the photographs and handwritten notes of February 11, 2025 when you made that third visit, and those are listed in here too as well; right?

A. I do not know that. You have to show me where they are listed.

Q. Sure. Do you see on page 24?

A. 24 of the second section of the four-section exhibit?

Q. Exhibit 10, yes, sir. Turn to page 24 at the bottom. Do you see in the center it says CLJA Photos SSPA 1 through 58, Bates stamps CLJA Photos SSPA 1 through 52.

A. I see that.

Q. Is that photos you believe to be that you took -- scratch that. I'll show them to you in a second. Turn to page 28.

A. Yes.

Q. Do you see the last entry there is called Hennet USA 1 through 96?

A. I see that.

(Hennet Exhibit 11 was marked.)

BY MR. DEAN:

Q. I'll show you Exhibit 11. Do you see that Exhibit 11 are your notes, sheets one and two, you prepared it appears on February 11, 2025. The Bates-stamp of this exhibit is Hennet_USA_34 and Hennet_USA_76. Do you see that?

A. I see that.

Q. So that is part of the reason for the supplemental reliance materials in addition to the errata changes, was also to provide these updated supplemental documents and data.

Do you see that?

MS. O'LEARY: Object to foundation.

THE WITNESS: I see that.

BY MR. DEAN:

Q. Now, what we're going to do, just so you know -- you can put that aside for the time being. Let me ask a couple more questions.

We talked about it earlier, but the supplemental reliance materials that are listed, I noticed that pages 1 through the middle of page 22 you listed out a lot of different specific materials. You've provided whether it be an author or whether it be a Bates-stamp, whether it be a JTC Environmental Consultant report, you listed out a lot of things individually on pages 1 through 22.

Do you see that?

A. I see that.

Q. Then the last, page 22 through 28, there's a lot of documents listed, which appear to be a lot of the production's Bates-stamps in this case.

Do you see that as well?

A. I see that.

Q. I guess my question is to understand how you may have prepared this list and did your work.

The first 22 pages where you specifically list out things, are those all of the documents, individual documents that you specifically rely upon for your opinions in this case?

MS. O'LEARY: Object to foundation.

THE WITNESS: Those are the documents that I provide in support of my expert report plus what you mentioned that I did after my expert report.

BY MR. DEAN:
Q. February 11?
A. February 11, yes.
Q. The documents that are listed in pages 22 through 28, and I'll just give you an example, if you look at page 23 and let's go down to the third entry CLJA OCPL 1 through 12, do you see that?
A. I see that.
Q. Can you tell me as you sit here what specifically those documents are?
A. I cannot.
Q. If there's anything in there that's important to your opinions and that you reviewed and relied upon, it's going to be in the first 22 pages?
MS. O'LEARY: Object to form and foundation.
THE WITNESS: I wouldn't agree with that without seeing those other documents.
BY MR. DEAN:
Q. Well, have you looked at every single page of every single one of these groups of millions of documents on pages 22 through 28? Under oath, had you reviewed every single page of

every single one of these productions?

MS. O'LEARY: Object to form.

THE WITNESS: No. I didn't review every page, but I basically went through a lot. And I may have missed some, but what was relevant to what I did I basically...

BY MR. DEAN:

Q. And you feel like you did a very thorough review of all these materials that are grouped together on pages 22 through 28?

A. I did as best I could.

MS. O'LEARY: Object to form.

BY MR. DEAN:

Q. And those that you found that were relevant to your opinions, you pulled them out and you've listed them on the first 22 pages that are cited in your report or referred to?

A. I do not think that reflects that. But in the report itself, you have footnotes. When something is specifically relevant, I would cite. Now, on the list of documents considered and/or relied upon, I listed basically what I have.

Q. Let's do this. I don't know if we can finish. I doubt we can finish, but we're going to try. Your photographs.

Well, let me ask you this: Is there some new opinion you now have as a result of the supplemental work that was done on February 12, or does this information just support some of your prior opinions?

A. You mean February 11?

Q. Yes, sir. I'm sorry.

A. No. My opinions are unchanged.

Q. So am I accurate that the work you did you believe supports what you've already said. You don't have any sort of new opinions?

A. Support or confirm.

Q. Did you create some new calculations to confirm for support some prior opinions that you expressed on or after February 11, 2025?

A. I didn't do calculations per se, but I just basically thought about what I observed on February 11, especially under filling of the water buffalo that I witnessed. But I didn't write anything or I did not calculate anything. Otherwise, you would have obtained it.

Q. So I've looked at the photographs, the still photographs that you took, which we're fixing to look at, and I think there was some movies in there, some video.

Do you remember that?
A. You will have to show me.
Q. Did you take all of those photos yourself and record those videos, or did someone else do it?
A. On February 11 I believe I took all the photographs. It might have been that I passed the camera to somebody if I was busy. Can you take a picture of that? I do not recall that. But on the previous visit, because of what we were told, I could not personally take photographs. So I would ask counsel to take photographs because I wanted to have that basically as a document.
Q. So all of these prior visits -- I won't hold you to the specific. We think it's about three -- including February 11, there were photographs taken either by yourself or at your direction by counsel?
A. I don't know if it was on every visit because sometimes they'd say no photographs. I don't recall exactly what the circumstances were, but they are not always the same.
Q. We'll get to it in a minute, but you clearly went in May of '24, and you clearly took photos or someone did because they're in your

report. Okay?

A. Yeah, on that one, on that specific one, I believe I had to ask counsel to take photographs because I was not -- the name of the game was the expert don't take photographs.

Q. Did they then send those images -- they, DOJ lawyer, whoever it was that took the photos, did they then text or email you those digital photos for the May '24 inspection if you didn't take the photo?

A. If I didn't take the photo?

Q. Yeah.

A. At some point I got them, yes.

Q. And the photographs that you took on February 11 using your phone, do you still have those digital original native images?

A. I don't remember taking them with my phone. I think I took them with a camera.

Q. Do you still have that camera digital photographs, original native files of the photos you took that day?

A. Well, I used the company camera, not my personal camera, and that camera is used for different projects.

Q. I'm not asking about the camera. I'm

asking the images, the Bates native images. Do you still have the native images of those photos you took on February 11?

MS. O'LEARY: Object to foundation.

THE WITNESS: My recollection they were downloaded and provided to counsel.

BY MR. DEAN:

Q. So you don't have copies of these native images?

A. I think I do.

Q. But, obviously, the Department of Justice, you believe you provided the native image files to them?

A. My recollection, it would have been electronic transfer of those photographs to them.

(Hennet Exhibit 12 was marked.)

BY MR. DEAN:

Q. We'll call it Exhibit 12 is all of those photos provided to us, whatever that date Haroon provided them.

MS. O'LEARY: I think just referencing Exhibit 10, which has the supplemental and corrected reliance list, we're talking about the Bates-stamps HENNET_USA_1 through 96?

MR. DEAN: Correct. Like I said, I'll

just give you this.

MS. O'LEARY: Is this a copy?

MR. DEAN: Yeah. I'm going to put them on the screen. Actually, I was going to put it into the record, but for all of us, I'm going to throw them on the screen and refresh his recollection about all these photos.

So for the record I've given you Exhibit 12, which are the photos and we're fixing to show the witness.

BY MR. DEAN:

Q. Now, do you see on the screen, Dr. Hennet, a photograph dated -- with a timestamp, date stamp of 2/11/2025 at HENNET_USA_1?

A. I recognize that photograph, yes.

Q. That document was produced to me as a .pdf. I'm representing to you I don't have the native file, but your representation to me is that you personally took that photo and you took it on February 11, 2025; right?

A. That's what I recall, yes.

Q. Now, whose hands are there? One person actually has got a booboo.

A. It's not me.

Q. Are your hands in that picture?
A. I don't believe so.
Q. Do you wear were cowboy boots?
A. I didn't wear cowboy boots that I recall.
Q. Do you know who's wearing the brown cowboy boots and the gray pants?
A. I do not know.
Q. Do you know who person is kneeling down with the blue jacket, tan pants and brown boots holding something?
A. That was a person. I don't see his face. But that was a person who helped doing those measurements because you cannot take those measurements alone.
Q. There's a rope there and there's a person holding to the left with a bandage on their left thumb.
Do you see that?
A. I see a bandage on somebody's hand?
Q. And that's not your hand?
A. That's not my hand.
Q. Now, there's a person standing back, and all I can see is two feet or two boots.
Are those boots you were wearing that

day?

A. I don't think so.

Q. So you're not in this photo?

A. I am not in the photo, but I was there.

Q. So we got at least one, two, three, four, five people at least were the there on February 11, 2025. Four are shown in the photo in some manner, and you're off to the side somewhere; is that correct?

A. The people who were there as I recall were basically myself, counsel. And then there was three, four, five people who work at the water treatment plant that were basically there to assist. And I asked them questions.

Q. What does that photo show? What is the purpose of that photo?

A. The photograph is at the water Hadnot Point water treatment plant treatment next to a spiractor effluent to the left. That structure that is covered with some metals there, that's the head of the spiractor at that plant.

Now, what is represented on the photograph we needed to use certain tools in order to be able to estimate through measurement certain distances, and the distance we wanted to measure was the distance between a reference point, which was that metal bar that was basically held on each side of the spiractor effluent area at the level that was basically making the bar always horizontal.

And then we had to measure a distance between that bar and the top of the effluent pipe in the spiractor. And the spiractor, at the time could do that because the spiractor was not online. So it didn't have water in it. So we could see the pipe and we could measure things.

So the way to do that was to use that bar and then in order to be able to get that distance, you could not go there physically because it would have been a complicated thing to do. You could not go there physically as a person. So we used a rope, that rope there, to basically position it where we wanted it to be positioned, vertically, to give a distance between the bar, the top of the bar in this case here, and what we wanted to measure, which was the top of the effluent pipe.

And then we could bring -- we did bring the rope, if you wish, and the bar back, and we measured that distance that way because we could not do it directly. It would have been involved getting into a system which would -- we were not prepared to do and would be extremely complicated to do.

Q. Maybe not the safest thing to do either; right?

A. It would not have been a safe thing to do.

Q. So the spiractor that you were doing this measurement there from top to bottom, I believe you mentioned or said that it was empty, it was dry, there was no water in.

A. There was no water in it, yes.

Q. You're at Hadnot Point water treatment plant; right?

A. That's correct.

Q. Did you take a look -- did you do any research before you did this experiment? I say experiment. I didn't mean to use that word.

Before you did these measurements and went to do the work, whatever it was you did that day on February 11, did you do any work to research or look at any design drawings or research anything about the history of the equipment that you were there measuring?

A. I looked at documents. Among those documents were drawings, but the drawings were not providing me what I wanted to evaluate directly, at least the drawings I was looking at.

Q. Where are these drawings that you were looking at?

A. In the records, I believe.

Q. Can you give me -- do you know what the dates of those design drawings were that you're referring to? Do you know where they were right now as you sit there today?

MS. O'LEARY: Object to form.

THE WITNESS: I do not know. They're in the record.

BY MR. DEAN:

Q. Are they in your office?

A. I don't know. They're in the record. So the records, I have access to the records.

Q. I need to identify what those records are is what I'm trying to get you to help me do, and we don't have to do it today if you don't remember. But do you have a copy back at your office of these drawings you were looking at before you went to do this work on February 11?

A. We have access of them. I believe so.

It will be in the record.
Q. How many pages were they?
A. I do not know.
Q. Do you remember anything about the dates of the documents?
A. I do not know.
Q. So other than looking at an unidentified yet design drawing or two, did you do any other work to ascertain the -- any historical maintenance, installation or anything like that related to the equipment you were measuring?
MS. O'LEARY: Object to foundation.
THE WITNESS: What I did is basically looked at schematics of the spiractors. And that didn't change over time to whatever I saw. It was the same type of spiractors. And there is nothing that I found in the records that say that would be a different type or that would have been changed. Spiractors are the spiractors, and they have to fit the bill in the sense that they are very large, very large volume for treatment that basically have to fit the plumbing of the a plant.
BY MR. DEAN:
Q. Understood. And you remember and it's listed in your reliance materials that AH

Environmental in 2004 did some of these similar, if not same, measurements you're talking about?
A. I don't think that's correct. AH did not do any measurement. They just looked at stuff and they estimated.
Q. So you don't think AH Environmental measured the spiractors like you did and similar equipment back then 20 years ago?
A. They did not.
Q. Let's go to photo 2.
What is the basis or why do you think or what do you rely upon to say that AH Environmental did not do some of these same measurements on certain equipment like you did in 2004? What are you relying on?
A. The AH report.
Q. And you don't remember anything in my report that relates to their doing any measurements?
MS. O'LEARY: Object to foundation.
THE WITNESS: What I recall is a report that say visual estimate.
BY MR. DEAN:
Q. Just a different angle, page 3?
A. Yes. This is just another angle. And

if you see the opening into the spiractor, it's that little basically rectangular opening there to the left. And that's one of the complication with the Hadnot Point spiractors. They are covered with basically a metallic protection cover.

MR. DEAN: Give me about seven more minutes -- it will be at a quarter till -- and see if I can get through this or not. Then we can take a break till about -- 45 minutes or so?

MS. O'LEARY: Are you okay? Do you need a break?

MR. DEAN: It will be about seven or eight minutes.

THE WITNESS: I can do seven minutes.

BY MR. DEAN:

Q. Next page. What is shown on page HENNET_USA Bates-stamp 4, and why are you taking that photo?

A. This photograph is basically taken from the other side of the spiractor, which has a bigger, a larger opening. You saw on the previous photograph you have a smaller opening on one side and a larger one on this side.

On here you can see the interior of the spiractor, no water. And what you are seeing in the middle of the photograph is a spiractor effluent pipe.

Q. And you say no water. How can you look at this photo and tell there's no water?

A. I am telling you there is no water. If there was water, you would see because the water when the spiractor is online is all the way to the rim of that pipe.

Q. Was there any water inside that pipe?

A. Can you repeat that, please?

Q. Is any water inside the effluent pipe?

A. No.

Q. The ruler there, again my eyes are getting bad as I age. I can't read the ruler there, the yellow ruler. Can you read it?

A. Maybe on another photograph you can. It was very difficult to measure this. I noticed that in my notes. And what we're trying to do here was without going into this dangerous place is basically to measure the distance between the horizontal bar and the rim of the spiractor effluent pipe.

Q. Why is that?

A. Because another measurements was to measure the distance between the horizontal bar to the top of the pipe. That would be to the left of this. The pipe basically doesn't come as much further out there.

Q. Can we go back one photo, please. Go back one more. We'll come back to that. We'll come back to that.

On photo 1, Bates-stamp 1, we can see -- it's a little blurry, but you can read those numbers. It looks like the gentleman's thumb on the right side is somewhere around -- is it 28 or not?

A. I think it was 28.

Q. Is that important that number 28, or is there some other important number?

A. Yes, it is.

Q. Why is the 28 important?

A. Because that's the distance, the total dance between the bar, the horizontal bar and the top of the pipe where it becomes -- after it finishes curving, if you wish.

Q. And the bar, is he holding it level or not?

A. Not here because now we removed it from the spiractor environment. But when it was in the spiractor environment where we deployed the roll there, there it was horizontal because it was held on both sides at the same level. And you can see the level on the rim of the spiractor itself because it is marked by the water.

Q. Did you measure that?

MS. O'LEARY: Object to form.

BY MR. DEAN:

Q. So when this was inside the spiractor like you're referring to, was there a measurement there so you would know the 28 inches here is correct?

MS. O'LEARY: Object to foundation.

THE WITNESS: Yes. When it was inside, it was the rope that was used because we could bring the rope there and basically have it suspended on the metallic horizontal bar to touch the top of the pipe.

BY MR. DEAN:

Q. Do you have the rope that's shown on page 1?

A. Do I have the rope?

Q. You used that rope as a part of this experiment or measurement and that was a vital piece of your tools that day to get this measurement; right?

MS. O'LEARY: Object to foundation.
BY MR. DEAN:
Q. Right?
A. The rope was provided by the base personnel.
Q. I understand that. My question, it was important for you to use a vital piece of tool to get the measurements. That rope was the one pieces of it?
MS. O'LEARY: Object to form.
THE WITNESS: Yes. That rope was selected because it's not a rubber band. It is basically something that will give you an estimate, a measured estimate of a distance.
BY MR. DEAN:
Q. Did you conduct a measurement to determine what the elastic characteristics of that rope was before you used it other than visual and yourself?
MS. O'LEARY: Object to foundation.
THE WITNESS: It's held the hope in my hand and said that's fine.
BY MR. DEAN:
Q. Did you take possession of that rope when you left doing this?

A. The base has possession of that rope.

Q. Who on the base has possession of that rope right now?

A. The water treatment plant personnel.

Q. Have you seen that rope since February 11, 2025?

A. I didn't go to the base since then. So the rope is there. I didn't see it since then.

Q. Did you ask anybody that day when you were talking to the personnel there at the water treatment plant, did you ask them to preserve that rope?

A. I did not ask them to preserve the rope.

Q. Have you ever since 2005, which we believe was maybe some of the first time periods you started doing a little work at time Camp LeJeune, for the last 20 years, have you ever observed Hadnot Point water treatment plant operations on and water in that spiractor?

A. Yes, I have.

Q. When was that?

A. For this case, the times I went to the base, every time I went there. And the spiractors that I observed at the time were actually online.

Q. When was that?

A. I went one time in 2024 and I believe I went one time in 2023.

Q. Did you take any photographs of the spiractors and the operations?

A. On the 2024 I didn't take pictures, but some pictures were taken by counsel.

Q. These same spiractors were there in 2024, is that what your testimony is?

A. Yes.

Q. And did you conduct any measurements when you were there in '24?

A. I did not.

Q. Was that rope there in 2024?

A. Not where you see on the picture. It was not there. I don't know if the base had that rope or not.

Q. When you were there in '24, you had some DOJ attorneys with you; right?

A. Yes.

Q. Did you have some of the well men, some of the well operations people there with you as well?

MS. O'LEARY: Object to foundation.

THE WITNESS: The best I recall, some people from the water treatment plant were there when we visited.

BY MR. DEAN:

Q. And in '24, did you have a cell phone with you?

A. Probably.

Q. Did you have a camera with you?

A. I did not have a camera with me because we were told pictures will not be taken by us.

Q. But pictures could be taken by base personnel, which they did?

A. Not base personnel. It was counsel.

Q. Did you ask the DOJ lawyers in '24 if you could do these measurements you did in 2025 when you were there in '24?

A. Could not have done those because you need some preparation to do this. It's complicated. On top of it, we were on a site visit with several people, other experts, counsel, several counsel. And the purpose of the site visit was not to do measurements at the spiractor. I do recall that -- and I could not have done this measurement there because I would not have had what I needed to do them. Now --

Q. After you were there in 2024 through February 11, 2025, did you make -- during that timeframe, May of '24, February 1, 2025, did you ever make any request for an additional visit -- excuse me. Strike that.

Between May of '24 and when you issued your report on December 9, 2024, did you make any request of the DOJ or the Marines to go back to the base to do measurements?

A. Through counsel I did. And I want to add that during the 2024 visit, unexpectedly there was a spiractor on the truck bed, that was on a truck bed. That was at the Holcomb Boulevard water treatment plant. And when I saw that, I said, well, it is there. It's not going to be there forever. And I asked counsel to take some photographs of that spiractor effluent pipe using a Metro card as a scale.

I have a Metro card. I know exactly the distance of it. And I used that as a scale on the spiractor and had counsel take photographs of that. So that's one.

Second, I did through counsel ask if the base could measure the distance that I am talking about here, that measurement that is important for parameters that is used in volatilization calculations. And I did on one spiractor effluent pipe at Holcomb Boulevard. And they provided me with a measurement. It was much easier to do that at the Holcomb Boulevard water treatment plant because the spiractor there are not covered with this metallic cover that you have at the Hadnot Point water treatment plant.

Q. Two more points. Then we'll take a break.

So you did think about the need to do the measurements you did on February 11, 2025 when you saw the effluent pipe over at Holcomb Boulevard; right?

A. The reason why --

Q. Let me go slowly through this and, if you could, you did think about the need to do some of these measurements that you ultimately did on February 11, 2025 back in May of '24 when you saw the effluent pipe on the back of the truck, but you were at Holcomb Boulevard and you did some measurements there; right?

A. Yes. That was an opportunity. I did that.

Q. Didn't have the equipment, didn't what you needed or circumstances weren't right for you at the time May of '24 and you went back and did it February of '25?

A. Yes. And reason I went -- that's one of the reasons I went back on February 11, 2025. It's because of what Dr. Sabatini basically in some sense rebutted my report on some aspect of it. In his estimates, he relied on a fall height, which is a very important parameter for calculating the losses that AH report basically provided as a visual estimate.

And I was in some sense criticized because the measurement I had was not measurements for Hadnot Point water treatment plant. They were measurements for the Holcomb Boulevard water treatment plant spiractor effluent pipe. And you have two such measurements. You have the one that was on the truck bed. Basically I was there when that was done. And later on, I had requested through counsel that the base perform a measurement on the spiractor pump, and I provided that to me because I did it.

Q. When you took those photographs, and they're in your report, we're going to go over them a little bit after lunch.

On the pipe that you saw, the effluent pipe that was in truck bed over at Holcomb

Boulevard and you saw it, I guess it had been used and it had been removed and it was in spare parts or to be discarded area or something like that; right?

A. That's my understanding on the truck bed.

Q. Did you do any work, see if had any serial numbers to ascertain how old it was? Did you do any metallurgy work on it, anything to ascertain how old that particular pipe was?

A. I didn't see anything that would allow me to do that.

Q. Do you even know if that pipe had actually been used in the past?

A. That pipe obviously had been used.

Q. Why do you say obviously? Because it was sitting in the back of a pickup truck in a base salvage area. How do you know where it came from?

MS. O'LEARY: Object to foundation.

THE WITNESS: Two things. The pipe had been obviously used because it was encrusted, if you wish, with deposits, which is typical of all the spiractor pipes that I've seen in place. That was one. And the second point is I was told at other times that it came from the Holcomb Boulevard.

BY MR. DEAN:

Q. Did someone show you where it was before it went in the truck bed when it was actually functioning?

A. No.

Q. Did you ask anybody where that pipe came from specifically?

A. I came from the plant.

Q. Which plant?

A. The Holcomb Boulevard plant.

Q. What do you base that on?

A. That's what I was told.

Q. By who?

A. The people from the water treatment plant.

Q. What was that person's name?

A. I do not know that person's name.

Q. Did you make a record of that person's name so if you need to go back to confirm anything, you'd have his or her information?

A. I did not.

Q. That pipe could have equally come from Hadnot Point, been on the back of a truck, and they parked it back there behind Holcomb Boulevard, couldn't it?

MS. O'LEARY: Object to foundation.

THE WITNESS: I was told it was from Holcomb Boulevard.

BY MR. DEAN:

Q. But to be fair and reasonable with me, you don't know, you didn't see where it came in from. It could have come from Hadnot Point as well?

MS. O'LEARY: Object to form.

THE WITNESS: It was on the bed of a truck, and that's all I can tell you.

MR. DEAN: Let's take a lunch break.

MS. O'LEARY: Before we go off record, I just wanted to note that Exhibit 7, which was the email, I understand from colleagues who's looked into this, we agree that this one was not among the group where we requested the clawback, but that was an oversight. We think it was missed because of the sort of thread nature. And we assert privilege over Exhibit 7.

MR. DEAN: So let's do it this way. Let's mark that section of the transcript confidential. And let's note on the record when we don't agree with you, but we'll deal with it later. And we'll mark that document pursuant to your request it be considered privilege and we won't share it outside. We probably won't even -- let's remove Exhibit 7. Exhibit 7 will not be attached to the transcript until this issue is resolved.

THE VIDEOGRAPHER: We are off the record at 1255.

(Recess from 12:55 p.m. to 1:47 p.m.)

THE VIDEOGRAPHER: We are on the record at 1347.

BY MR. DEAN:

Q. Let's go back to Exhibit 11, your notes. It should be in there Exhibit 11.

A. Got it.

Q. Now, as we go through this, if you want me -- I'm going to throw some photos -- we're going to go back through the photos at some point in time. But what I'm saying is if you feel like it would be better for me to throw one of these photos up for you to illustrate what you're doing here, just tell me.

A. I will.

Q. We may jump around a little bit too

because I don't have photos of water buffalos up here yet. But let's go to item number two. Explain to me -- it says spiractor effluent pipe. That's a good photo to use? Tell me. If not, I'll find a different one. Tell me what your notes say in No. 2 and how that information supports your opinions.

MS. O'LEARY: For the record, that's in Exhibit 11.

MR. DEAN: Correct, Exhibit 11.

THE WITNESS: So item two on Exhibit 11 is basically an explanation of the result of the estimated measurements that I performed on February 11, 2025 at the HP WTP, HP water treatment plant spiractor effluent pipe.

BY MR. DEAN:

Q. So which pipe -- so we're clear, you appear to be taking some measurements. You've recorded some measurements here. Which pipe are you measuring the 14-1/2 to 15, the 24 to 18? Is it at Hadnot Point? Is it the one that was -- which pipe are you measuring?

A. This is specifically related to Hadnot Point and the photographs that we have looked at.

Q. So you're measuring that pipe in photo

Hennet 4 dated 2/11/25?
A. That's correct.
Q. Is that a good photo for you to use to -- let me tell you what I'm trying to figure out, and I don't care how we do it, whatever is most convenient and quick for you and me both. I'm trying to find a photo that can demonstrate what you're doing in number two.
MS. O'LEARY: And that's on Exhibit 11?
MR. DEAN: On Exhibit 11.
MS. BAUGHMAN: Kevin, for the record what you're showing now is No. 8?
MR. DEAN: Is HENNET_USA_8.
BY MR. DEAN:
Q. So eight is one possibility. Stop me if you see a photo that you think might help us illustrate what you're doing in No. 2.
A. This is a photograph that I took.
Q. We're looking at HENNET_USA_38 taken 2/11/25.
My question is: Do that help illustrated the measurements that you're showing on Exhibit 11 under item No. 2?
A. Yes, it does.
Q. And what does it show?

A. It is basically a measurement of the diameter of the effluent pipe.
Q. And is that effluent pipe that you're measuring there at Hadnot Point water treatment plant?
A. Yes.
Q. And did you inspect -- first of all, did you ask anybody when that particular pipe was installed? Did you get any history from anyone?
A. Nobody knew.
Q. Did you ask?
A. Yes, I did.
Q. Did you look at any documents to ascertain when that effluent pipe extension or end was installed?
A. I found no information as to this particular pipe installment.
Q. Did you look at the pipe to see if it had any markings on it, serial numbers, markings, where it came from, anything like that, to give you any information about its era?
A. There is no such information that I could see.
Q. Again, do you have a better photo? Is that is the best photo angle? Because of where

you were situated, I understand it was a safety issue. You didn't have the ability to shoot straight down, did you?
A. I did not have that ability.
Q. So you're measuring the inside diameter; is that fair?
A. That's correct.
Q. And so the 14-1/2 to 15-inch measurement that you're doing there is the inside diameter best estimation just because you can't see straight down?
A. Right. It is the best measured estimate of the diameter of the effluent pipe.
Q. Now, see if we can get this other measurement photo. You were measuring -- is this the same pipe at a different angle?
MS. O'LEARY: For the record, this is 82.
MR. DEAN: I'm sorry.
BY MR. DEAN:
Q. I'm showing you, Dr. Hennet, HENNET_USA_82 showing that you took it on 2/11.
Is that the same you pipe or a different pipe than the photo we saw before?
A. This is the same pipe.

Q. And what is purpose of the measurement in the photograph 82, page 82?

A. It's to obtain measurement -- measure estimate of the distance between the top of the metallic bar, the horizontal bar, to the rim of the effluent pipe.

Q. And is that shown on your -- your interpretation or your measurement estimate, is it shown in Section 2?

MS. O'LEARY: Exhibit 11.

BY MR. DEAN:

Q. On Exhibit 11.

A. It is not shown on Exhibit 11, but that was measured in order to have dimensions for the pipe, per se. This is the distance from the reference bar to the rim.

Q. And what's the inside diameter of the horizontal part of the pipe?

A. The inside -- I couldn't measure that part, but having observed the other effluent pipe that was from the Hadnot Point treatment plant, the pipe is actually -- the diameter appears to be actually a little bit smaller away from this area that you have on the photograph and maybe further away than what even you can see on the photograph.

Q. So this is a Hadnot Point spiractor tube, right, pipe?
A. This one is at Holcomb Boulevard water treatment plant. That photograph was not taken by me.
Q. Who took that a photo?
A. Base personnel upon my request.
Q. We're looking at CLJA_USMC_spiractors 2, and you believe that photo was taken at Holcomb Boulevard?
A. Yes. It was taken at Holcomb Boulevard.
Q. That pipe, the effluent pipe and the supply pipe at the bottom where they come together, they're the same size appear in this photo?
A. Yes, they do.
Q. Where is that photo, HENNET_USA_9, taken?
A. This one was taken at the Hadnot Point water treatment plant.
Q. And did you measure -- so is this the same pipe that you measured the inside diameter of the top of the spiractor?
A. That is the same pipe that we looked at before, yes.

Q. Did you measure the section of the pipe, the supply pipe that comes to the curved spiractor end?
A. No. What I measured was the distance between the top of the horizontal bar to the top of the pipe at that location with a rope that we discussed before, and then I measured the length of that distance.
Q. I understand that. If I also remember for the record, I mean, all this stuff was empty, dry?
A. Everything was dry.
Q. But what I was trying to figure out is what is your belief the diameter of this pipe is right here? It looks like to me it's PVC of some court.
A. It is not PVC.
Q. The two pieces are assembled in this little area here with the crease; right?
A. That's my understanding, yes.
Q. Did you measure the diameter of the first part of the pipe that's coming out of the wall?
A. No. I could not do that.
Q. So you don't have any idea of the size

of this pipe that's supplying the effluent pipe ending piece there?

A. That portion of the pipe doesn't supply. It is an exit. So the water enters the effluent pipe from the rim you see there, and it goes by gravity that way (indicating).

Q. Do you know when the spiractor is active what the level of water would be in the effluent pipe horizontally?

A. That was estimated in the AH report as approximately 6 inches. That would be called the tail end water height.

Q. Can you show me -- I've got on the screen -- I'm showing you HENNET_USA_10. Can you tell me the purpose of that measurement?

A. This measurement is a measurement of the distance between the top of the water reservoir to basically vent, exit.

Q. I cannot -- is there some reason someone didn't take the photo so you can see the measurement of the pipe clearly?

A. I think there are photographs that show that.

Q. But that particular one you can't tell the exactness of the measurement, can you, in that angle?

A. You can make a fair guess, but I think you have a better photograph of that particular vent pipe.

Q. I'm showing you HENNET_USA_11. Do you know what the purpose of that photo is and what's going on there?

A. This is -- this was explained to me to be the treated water after it comes out of the sand filters, treated water.

Q. I'm not following. Is this an experiment? A demonstration. First of all, let me ask you this: Where was photo taken HENNET_USA_11?

A. It is inside the Hadnot Point water treatment plant.

Q. Did you turn the water on?

A. No. The water is the always on.

Q. The water is always on. And that vial that's being filled up, was it always there?

A. I do not know.

Q. Did you put the vial under the water faucet?

A. I did not.

Q. So do you know why that is there at all

from any water supply reasons?
A. I do not know the reason for the (indecipherable) to be there. I do not know.
Q. Does this have anything to do with any of your opinions other than it's just an observation when you were in the treatment plant?
A. I took these photographs because it was explained to me this is where the treated water, after it comes out of the treatment, that's where the samples are taken. That's why I took that picture.
Q. We're looking at HENNET_USA_7. Is that okay size-wise? Can you tell me what HENNET_USA_7 is or the purpose of the photo?
A. This is an open area that was open for me of the finished water reservoir at the Hadnot Point water treatment plant.
Q. And is this season normally covered up?
A. Normally that door is closed, yes.
Q. And where is the normal water level?
A. The water level for the reservoir fluctuates I was basically informed of by about, if I recall, 4 feet per day up and down.
Q. So when you measured it at whatever time it was on February 11 -- I guess the water level

is this level right here under the first stair?
A. I interpret this as the top of the water level.
Q. You interpreted this to be the top of the water level just below -- between the first and the second step?
A. Yes. And, as a matter of fact, it was explained to me to be that, because if it goes higher, the water would exit the reservoir through an overflow pipe or vent.
Q. Now, what stage of treatment is this? Is this ready to be furnished? Is this finished water ready to be pumped out, or is it still in the treatment process?
A. This is finished water, which is basically ready to be pumped into the supply system.
Q. When you were there on February 11, did you drink any water?
A. I don't recall. I probably -- not there. I wasn't there.
Q. You might have had bolted water. But did you drink this water at Hadnot Point?
A. I didn't go down there to have a look, no.

Q. Does that look like water you would want to drink with all the rust in that tank and all the pipe going down? Does that look like safe water even today?

A. Safe water is based on measurement of that water. And this is not an unusual setting for a water reservoir that has been there for a while.

Q. Who told you the fluctuation was 4 feet?

A. People at the base when I asked that question. They have a system, and based on that system, they were able to answer that question.

Q. What do you mean by "they have a system"?

A. They measure it, I mean, automatic measurement.

Q. What was the person's name that told you that it was a fluctuations of 4 foot?

A. It was a person who worked at the water treatment plant.

Q. What was that person's name?

A. I do not recall his name.

Q. Did you make any notes other than the two pages that we have that would identify this person and the specific statement they made about

4 feet?

A. I did not take his name. The people were there basically serving the base. They don't give me their names. They're working. They're doing their job. And I ask them questions and they responded and I noted it.

Q. Do you, yourself, personally observe a 4-foot fluctuation of the water level in order to be able to use that information to support or use those observations to support your opinions?

MS. O'LEARY: Object to foundation.

THE WITNESS: No. I could not have seen that within the short time that I observed this reservoir water level.

BY MR. DEAN:

Q. If you stayed there for 24 hours and observed this well, you would possibly have been able to make that observation; right?

A. That's possibly.

Q. And was there more than one person who told you about the 4 feet or were there like four or five people standing around that agreed it was 4 feet? How many people were you talking about to about the fluctuation, one or more?

MS. O'LEARY: Object to form.

THE WITNESS: There were several people. And the question was posed when we were in the room where they have the water pressure monitoring done. They have a computer that basically shows water levels in different places. And the reservoirs are one of those places.

BY MR. DEAN:

Q. Did the system of measuring the fluctuation of the water levels, did you ask them if they kept any records of that?

A. I know they measure it. I would say they probably keep a record of that for a period of time.

Q. Not you. I'm talking about you got information from the unnamed person who gave you the 4-foot fluctuation. My question was a little different.

Did you ask them whether they kept records of that fluctuation using their measuring system? Did they keep any records of this 4-foot fluctuation measuring system?

A. I do not know if they keep records, but that's something they monitor because it is important. If it is too low, there can be a failure. If it who high, it will overflow.

Q. Did you ask how long they had been using this system to measure the fluctuation to be able to say it's 4 feet?
A. What I was told is that that's a parameter that has to be measured for the system to function. I can extrapolate that to say from day, one they were monitoring the water level on the reservoir, and it goes up and down because it demands (indecipherable).
Q. You did you ask this person how long their measuring system had been a recording a 4-foot fluctuation? Did you ask this person that question?
A. I was told that it was basically typical fluctuation.
Q. Do you know how long that person had worked to the water treatment plant?
A. Not exactly, but I ask. People that were there were working there for 10 years, 15 years, but not a hundred years.
Q. The specific person that told you the 4-foot fluctuation, specifically since you don't remember that person's name, do you know how long that person had been on the base to make these observations?

A. As I said before, they were several person in the room, and all those people were operating this. And basically the answer was provided, and everybody chimed in. They say that's typical. That's what I do recall.

Q. You said in the room. Did you all have a meeting either before or after you did the site work?

A. Yes. When we talked about those specific things, like water level fluctuation, that was done inside the water treatment plant.

Q. At a conference room of some sort?

A. Yes, in a room inside the Hadnot Point water treatment plant.

Q. You had a note pad that has S.S. Papadopulos & Associates with you; right?

A. Yes.

Q. Did you create Exhibit 11, the two pages of notes, on February 11, or did you go home the next day or two and fill out these from some other records you had?

A. I don't remember when I did this. Probably the next day this.

Q. Did you copy off of something else that you had?

A. I probably took some notes of that, like very brief notes because some of those notes you have standing. And then I just put them so they can be understood.

Q. While you were in the room and you were taking notes on some other note pad or some other notes, did you write down the things that this person was telling you on that note pad?

MS. O'LEARY: Object to foundation.

THE WITNESS: Yes, I did. Then I transferred that here. And then basically I discarded the draft or I may still have it. I do not know that.

BY MR. DEAN:

Q. Do you know where those other notes are for which you created Exhibit 11 notes the next day?

A. If they still do exist, I have them in my office probably.

Q. Well, do you know as you sit here today if you still have them?

A. And I do not know right now.

Q. But right now we do know you don't remember the names of the individual or individuals in the room that provided you this

that 4-foot fluctuation history; right?
A. The names of those people was not provided to me.
Q. Did you ask and they just didn't want to give you that info?
A. I was told that there is no photograph of individuals. And basically you had four, five people there depending on when in the tour. And I did not ask the name of those individuals one after the other.
Q. Did you walk in the room and extend your hand and introduce yourself?
A. No.
Q. Did they introduce themselves to you?
A. No. I was basically following the leader of the visit or the leaders of the visit, which to my understanding was basically the person in charge of the entire treatment plant.
Q. Did you tell me you thought they kept measurement records or not?
A. I said you can ask them if you want. But they do measure things, and measurements typically are kept for a period of time. I do not know the period of time.
Q. Fair. Did you ask them whether -- to

look at those measurement records to verify the 4 foot that you had been told?

A. Well, I recall that they showed me on the screen some fluctuations. I recall that. And those numbers came basically from those.

Q. What screen were you looking at?

A. Again, it was in a room where they do monitor those devices that measure the elevation in many places, including the water towers, in the water reservoirs, the finished water reservoirs, the old water reservoirs, those kinds of things.

Q. We're making progress. You're in a room with some individuals that operate the water treatment plant at Hadnot Point; right?

A. Some?

MS. O'LEARY: Object to form.

BY MR. DEAN:

Q. And you are taking some notes on another piece of paper about observations, what you're learning as you're talking to these and they're showing you a computer screen with some data. Sounds like to me it's a chart, flowchart of some sort.

MS. O'LEARY: Object to form.

THE WITNESS: First of all, there was

individuals, not only one.
BY MR. DEAN:
Q. I understand.
A. Second of all, they showed me that. And I asked specific questions, like what is the water level fluctuation in the finished water reservoir. I asked that question and they answered.
Q. I understand.
A. I am not finished. And then they also showed me on the screen some graphs of water fluctuations in the water towers and the reservoirs. That's what I recall. I'm not finished.
And then I took notes of that. And for the reservoirs, my note is 4 feet typical per day. And for the water tower, it's basically 6 feet, if I recall, typical per day.
Q. Thank you for that. I was asking a little different question sort of as a lawyer.
The screen you were looking at, is it a computer screen or a TV screen?
A. It was a computer screen smaller than the one you're showing me now, but it was hooked up to a computer I suppose because I did not check where the extension word went.

Q. And you were looking at some from computer data history records of some fluctuation data of some sort; right?
A. That's right.
Q. And could you tell from looking at the screen or asking questions how far back the information and data went?
A. I think so because you had two axes. One was in feet and the other axis was basically time, time and date, as I recall. And what I saw was basically what was going on.
Q. But you don't know how far back that information went?
A. I do not know how far back that information could be retrieved. I do not know that.
Q. Was there a printer room?
A. I do not know that.
Q. Did you take a picture of the screen that you were looking at to get the information for which you now opine that it's approximately a 4-foot fluctuation?
A. I did not taking a picture of that.
Q. Did you ask anybody if they had the capability to print out the screen you were

looking at in order to base your opinion of a 4-foot fluctuation?

MS. O'LEARY: Object to form.

THE WITNESS: I did not.

BY MR. DEAN:

Q. If you were talking to these well operators in 2025 and they've been there 10 or 15 years, assuming you're accurate, that means that they may have started their employment 2010 hypothetically using that math; right?

MS. O'LEARY: Object to form.

THE WITNESS: I do not know the exact employment history of each one of those individuals. But I asked was anyone there in the 1980s, and the answer was no.

BY MR. DEAN:

Q. So none of them were there in the '80s.

Do you know if any of them were there in 2004? Did you ask that question?

A. I did not ask that question.

Q. And the record you were looking at, how long did you spend looking at the screen -- let me strike that and ask a different way.

All I'm trying to figure out is the fluctuation data you were looking at, the screen, and you said it was an axis chart. Do you know what the timeframe of that chart was that you were looking at? Was it data for 2024 or 2025, the last few weeks? What era was that data and the information you were looking at on the screen?

A. My recollection, the time axis was by the week.

Q. So the week before you got there?

A. Yes, because it was up to date.

Q. Did you ask anybody what were any changes in the operations, the pumping operations there from 2004 to the week before you were there? Did you ask anybody if they were aware of any differences in the operational characteristics of the plant?

A. I asked that question. Basically, to their knowledge, it was still the same. They were just keeping operating it the same way.

Q. How long were you in the room with them approximately?

A. Which room?

Q. The room where you were looking at the data on the screen.

A. I don't know, 20 minutes, 30 minutes.

Q. Was there a desk in this room, chairs?

A. For the people who work there, yes. I was standing.

Q. Were there file cabinets?

A. I do not recall that.

Q. Did you ask them while they were on the computer showing you that screen to go into any historic records and look at any additional documents or information?

A. No, because I asked the question. The question I asked was in another room. Everybody was standing. But it's inside the plant. And then to answer those questions, we went to that room where you had the computer screen that basically showed me the fluctuations.

Q. Did you ask before you went out to do your measurements -- for example, you can see the spiractor pipe HENNET_USA_4.

Did you ask any of those gentlemen in the 20-minute meeting whether or not any of these spiractor pipes had been changed since 2004?

A. I asked that question, but it was not in the same room. It was in the previous room when I asked a series of questions. Nobody was aware that any one of those pipes was ever changed to their recollection. That's what that answer was.

So the answer was no.

Q. And you don't know their names. You don't know exactly how many people were in the room. You were looking at data on the screen that was for the week before you arrived. The pipes, they don't remember them being changed while they've been employees, but you don't know how long they've been employees; right?

A. Approximately as I answered before.

Q. 10 to 15 years?

A. The oldest one maybe 20. I don't know. I just tell you what I recollect.

(Hennet Exhibit 13 was marked.)

BY MR. DEAN:

Q. Now, Exhibit 13 I believe is the AH Consultants December 2004 report that you and I have been talking about; correct?

A. That's the report I mentioned, yes.

Q. Do you see on -- turn to page 1-1.

A. Yes.

Q. The last sentence at the bottom of Section 1.1, does it read, "As a part of this effort, AH conducted a literature review and a search of the appropriate archives to assist in the development of reference estimates of the VOC removal rates that you might have occurred through Hadnot Point, Holcomb Boulevard and Tawara Terrace water treatment plants."

Did I read that correctly?

A. You read that correctly.

Q. On page 2-1 under the Chronology section, second full paragraph beginning, in 1982 contamination of the Hadnot Point and Tawara Terrace water systems with tetrachloroethylene or PCE and TCE was detected during monitoring of trihalomethanes.

Do you see that?

A. I see that except you didn't read it correctly.

Q. Do you want to read it for me? I was embarrassed because I couldn't pronounce the words. So you go ahead and read it.

A. "In 1982, contamination at the Hadnot Point and Tawara Terrace water systems with tetrachloroethylene (perchloroethylene or PCE) and trichloroethylene (TCE) was detected during monitoring of trihalomethanes."

Q. Now, on page -- in your report -- you might want to lay your report next to you. I believe we marked it Exhibit 3.

A. I found Exhibit 3.
Q. Let's finish this first. On page 3-6 of the AH report is where I'm at now.
MS. O'LEARY: Is that Exhibit 13?
MR. DEAN: Yes, ma'am.
THE WITNESS: Yes.
BY MR. DEAN:
Q. It says at the bottom, "The spiractors at three treatment plants were identical in capacity and dimensions. In the model, removal of VOC occurred from the top surfaces are shown in Figure 3.1 as well as from the nappe (i.e., the sheet of water falling over a weir) believed to be formed at the center effluent pipe."
Do you see that?
A. I see that.
Q. And then that figure is on the next page at the top.
A. Yes. I see that.
Q. What's in that photo or that figure?
MS. O'LEARY: Object to foundation.
THE WITNESS: This is a schematic of the entire spiractor.
BY MR. DEAN:
Q. And it shows in it the entire spiractor

is a 22 foot tall; right?

A. That's correct.

Q. It's 10.4 foot wide?

A. At the top.

Q. And it shows the spiractor pipe, I guess, at the top exiting to the right?

A. Yes. That's the exit by gravity of the spiractor pipe at the top.

Q. At the end of that first paragraph -- let's read the first sentence. "Images of the pipes at the Hadnot Point water treatment plant are provided in Figure 3.2 and in Figure 3.3 and a detailed sketch of the effluent pipe is shown on Figure 3.4."

Do you see that?

A. That's the first sentence on that page. Yes.

Q. The last sentence, and I just want you to tell me what you understand this means, says, "The critical depth for a circular 12-inch pipe at a flow rate of 1 MGD is approximately 6 inches."

What does that mean?

MS. O'LEARY: Object to foundation.

THE WITNESS: Well, the MGD is million gallon per day. And that's basically the flow,

the capacity of flow through for a spiractor.
BY MR. DEAN:
Q. If you turn to page 3.8, next page, you see a picture, Figure 3.2 of that effluent pipe?
Do you see that?
A. I see that, yes.
Q. And it says the era according to the research done by AH Environmental in 2004, that this photo was a 1941/1942 era photo.
MS. O'LEARY: Object to foundation.
BY MR. DEAN:
Q. Correct?
A. That's what it says. I have no way to verify that the photograph was taken in 1942 or 1941.
Q. Then there's a different looking pipe at the same Hadnot Point water treatment plant spiractor in a photo in Figure 3.3, on the next page, 3-9, says on the photo it was a 1944, 1945 era photo. Do you see that?
MS. O'LEARY: Object to foundation.
THE WITNESS: I can read that under the photograph.
BY MR. DEAN:
Q. And do you agree with me that effluent

pipe is different than effluent pipe in 3.2?
A. That particular pipe is I would call it L shaped. The other one is called J shaped pipe, but they serve the same purpose.
Q. I understand they serve, but they're different pipes?
A. They are different shape pipes.
Q. Now, if you go to Figure 3.4, do you see where AH Environmental has measured those dimensions of those pipes?
MS. O'LEARY: Object to foundation.
THE WITNESS: My understanding is I didn't measure those dimensions. It's a visual estimate.
BY MR. DEAN:
Q. Where do you get that from?
A. I don't recall exactly where, but it is in the report.
Q. Turn to page 3-7. In the middle of the paragraph it says the fall height. Do you see that?
A. Yes.
Q. Is that the sentence you're referring to?
A. Yes. And I define the fall height on

Figure 3.4 that we just looked at. And there you have the fall height sketched out.

Q. No, sir. That says the fall height was estimated visually. That doesn't say that the pipe was not measured. Do you see what I'm saying?

MS. O'LEARY: Object to foundation.

THE WITNESS: What I am saying is that the fall height was not measured. The fall height is the most important parameter here.

BY MR. DEAN:

Q. I'm not disagreeing with you.

A. And that was not measured. I see no indication they did actually measure the diameter of the pipe.

Q. Well, there's no evidence they didn't in this report, is there?

MS. O'LEARY: Object to foundation.

THE WITNESS: I will have to read the report again, but to my understanding, they did not measure those values. I estimated them. And the most important one is the fall height.

BY MR. DEAN:

Q. They measured the inside diameter of that pipe to be 12 inches, that top measurement;

right?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: You will have to show me where in the report it says they measured it.

BY MR. DEAN:

Q. Can you show me in the report where they say they did not measure it and they got these measurements visually from some picture of a pipe?

A. I have not soon seen a picture of a pipe with a scale that could give you a measurement of any of those values.

Q. So then you would agree with me they would have had to have physically measured these pipes on the scene?

MS. O'LEARY: Object to foundation.

THE WITNESS: They did a visual estimate for the fall height. Why not a visual estimate for the other dimensions that they provide on this diagram.

BY MR. DEAN:

Q. They're showing that the water in the pipe and the measurement they're taking is 12 inches plus 2 to get 14; correct?

MS. O'LEARY: I'm sorry. What are we

looking at?

MR. DEAN: I'm looking at the AH report, and I'm going to stay on the AH report until I give you another exhibit number. I believe it's Exhibit 13.

MS. O'LEARY: What page?

MR. DEAN: I'm on page 3-10, same page we've been on.

THE WITNESS: Can you repeat the question, please?

BY MR. DEAN:

Q. Do you see that they took three different measurements or they show three different measurements there. First one is at the top, 2 inches. And then they go -- the pipe goes down 12 inches and it stops in the center, and they're depicting a water level.

Do you see that?

MS. O'LEARY: On object to foundation.

BY MR. DEAN:

Q. Which would be at 14 inches.

MS. O'LEARY: Same objection.

THE WITNESS: Again, it is a visual estimate. They did not show any measurement that would show the 2 inch. It could be 2 inch. But the 12-inch for the fall height, which is a value that is important, I did not measure.

BY MR. DEAN:

Q. And then there's a measurement here of 6 inches from the center down to the bottom of the pipe; right?

MS. O'LEARY: Objection. Foundation.

THE WITNESS: My understanding is I did not measure that either. I assumed that.

BY MR. DEAN:

Q. Well, that's what I'm saying. You're speculating regarding whether AH took actual measurements of whatever pipe they were looking at or what they were doing in 2004; right?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. You don't know what they did.

MS. O'LEARY: Object to form.

THE WITNESS: Let's look at them one at a time. We discussed already the 12-inch I estimated. The 2 inch is also an estimate. And the 6 inch, they also estimated for a pipe of 12-inch diameter that is basically flowing by gravity at the given flow of the spiractor. To me all of those are estimates, not measurements.

BY MR. DEAN:

Q. Is that AH Environmental still in business?

A. I don't know. I believe so, but I do not know specifically.

Q. Did you make any attempt to reach to contact maybe at AH Environmental to verify what they were referring to on the page we were just reviewing?

MS. O'LEARY: Object to the form.

THE WITNESS: I did not.

BY MR. DEAN:

Q. Now, turn to page 4-15 in your report, please.

MS. O'LEARY: This is Exhibit 3.

MR. DEAN: I'm sorry.

BY MR. DEAN:

Q. Let's go back. Before we go back, let's go back to Exhibit 13. There's one thing I forgot to ask you.

If you turn to page 2-5 of Exhibit 13.

A. I am on page 2-5.

Q. Under 2.3 Water Plant Descriptions Systems, does it read, "The water systems of concern in the ATSDR study including Hadnot Point, Holcomb Boulevard and Tawara Terrace are described in the following sections. The descriptions are based on interviews with base personnel, site visits and an examination of the design and as-built drawings that were obtained as a part of this project."

Did I read that correctly?

A. You did.

Q. So AH did do site visits?

MS. O'LEARY: Object to foundation.

THE WITNESS: It says they did, yes.

BY MR. DEAN:

Q. And in 2004, 21 years before you were there, the personnel at the base in 2004 would have been closer in time to the early 2000s.

A. I don't know. It's likely.

Q. Now we're finished with Exhibit 13.

Would you go to page 4-15 in your report, which I believe is Exhibit 3.

A. 4-15?

Q. Yes, sir.

A. Yes.

Q. In the second paragraph, you say, under 4.5, "The first known analysis of the Camp LeJeune drinking water for VOCs that included COCs was in

October 1980." And you footnote 41 and refer to 1980 Jennings lab report; right?
A. You read that correctly.
Q. If you turn over, let's start the sentence at the bottom of page 4-15, last sentence, it begins for, about three lines up, "For example, the composite sample contained 39 percent, 18 and 11 percent of finished water from HP, TT and HB-WTPs, respectively."
Did I read that right so far?
A. Yes, but you didn't finish sentence.
Q. You're right. I'll come back. "The 39 percent that's above that is the Hadnot Point reference, the 18 is Tawara Terrace, and the 11 is at Hadnot Point, Holcomb Boulevard.
A. Yes, that's correct.
Q. Then the sentence completes. The rest was from the five other water supply systems.
A. Correct.
Q. "Analytical results" -- go to the next page 4-16 -- "reported on October 31, 1980 showed only trace levels of COCs in the composite (TCE reported at .005 milligrams a liter; 1,2-DCE at .006 micrograms a liter; VC at .01 micrograms a liter; PCE not detected; benzene not detected)."

Do you see that?

MS. O'LEARY: Object to foundation.

THE WITNESS: I see that except that for TCE you said 0.05 milligrams per liter.

BY MR. DEAN:

Q. What is it?

A. It is microgram per liter.

Q. Then you say, "Even assuming a worst case scenario that all the reported COCs came from Hadnot Point water treatment plant water, that would yield only trace level COCs in that system."

Do you see that?

A. I see that.

Q. Then "The same can be calculated for each water system, and none would show COC concentrations above trace levels. This indicates that none of the water supply systems were contaminated with COCs at that time."

Did I read that correctly?

A. You did.

Q. Am I understanding that opinion is based on a composite sample that was taken in 1980, that sole opinion is based on this composite sample, sole composite sample taken in 1980?

MS. O'LEARY: Object to form.

THE WITNESS: That description is based on water samples taken at eight different water treatment plants, brought to the lab, composited by the lab. Labs do know how to do that. And the composite that was analyzed.

BY MR. DEAN:

Q. Do you know if all those wells were operating the day that sample, composite sample was created?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: Explain to me what you mean all of those wells.

BY MR. DEAN:

Q. Well, the wells that you say were sampled to make up the composite sample, were those wells operating the day the sample was taken?

MS. O'LEARY: Object to foundation.

THE WITNESS: It was not wells that were sampled. It was --

BY MR. DEAN:

Q. I'm sorry. Water at water treatment plants that created the composite sample, do you know if the plant was operating or the wells were operating that day the composite samples were taken from the water treatment plant?

MS. O'LEARY: Object to foundation.

THE WITNESS: I'm confused because it seems you confused wells and water supply.

BY MR. DEAN:

Q. I may have in my first part of my question. I'm trying to clear it up now. My understanding is composite samples that are being referred to here, eight systems were taken, 39 percent from the Hadnot Point water treatment plant, 18 percent from the Tawara Terrace water treatment plant, and 11 percent from the Holcomb Boulevard water treatment plant; right?

A. I don't think that's correct. What is correct is samples were taken at eight water treatment plants, basically finished water. So samples were. And then they were brought to the lab or the lab took them. And in the lab they were composited in a manner that is reflected in that paragraph, 39 percent for Hadnot Point, et cetera.

(Hennet Exhibit 14 was marked.)

BY MR. DEAN:

Q. I'll show you Exhibit 14. Just lay it there next to you. We'll be referring to that. For the record, this is Exhibit 14. It's CLW 430 through 434, which is the document you reference for your sentence footnote 41. Also known as CLJA_USMCGEN_6650 through 6654.

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. Do you see listed on the first page of Exhibit 14 the eight marked samples?

A. Just checking something here. I see this.

Q. Let me ask you --

A. It seems to be an issue with the Bates number on these documents because you have --

Q. No, sir. Let me help you if I can. Your sentence, The first known analysis of Camp LeJeune drinking water's plot for VOCs that has included COCs was in October 1980. Footnote 41.

Footnote 41 says Jenning Laboratories 10/31/1980 Camp LeJeune Justice Act CLW, CLW 430 through 435. I put in front of you Exhibit 14 is the CLW 430 through 435 document you're referring to.

A. You are correct. But there is another Bates number.

Q. I agree. I agree. But you refer to -- I'm just using the one you refer to and making it clear that it's the same one.
You agree with that?
A. I agree with that.
Q. The first two samples are Hadnot Point water treatment plant samples; right?
MS. O'LEARY: Object to foundation.
BY MR. DEAN:
Q. Sample 1 is Hadnot Point Building 20, which is the Hadnot Point treatment plant?
A. Right.
Q. Sample 2 is -- and they took two quarts from there, which is a 152 milliliters; right?
A. No. It's 1,500.
Q. I'm sorry. You're right. And Number two sample, they one quart from Hadnot Point Building 670?
MS. O'LEARY: Object to foundation.
THE WITNESS: Yes. Building 670 is Holcomb Boulevard.
BY MR. DEAN:
Q. Treatment plant?
A. Treatment plant.
Q. Now, this is dated October 31, 1980 when

the report was issued, but it says the samples were taken on October 1.

A. That's right.

Q. Do you know if on October 1, 1980 Hadnot Point well 651 was running?

A. I do not know. Nobody knows that.

Q. Have you done any work to ascertain from historic records whether or not well 651 was operating on October 1, 1980?

A. I have looked. I have looked quite a lot to see what is the information on when well 651 was operated.

Q. So go back to your report. And your report, last sentence of that first paragraph I read, says, "This indicates that none of the water supply systems were contaminated with COCs at that time."

Do you see that?

A. That's a true statement, yes.

Q. And you rely on this report, October 31, and everything else you say in that paragraph to reach that conclusion?

A. Yes.

Q. I just want to make sure I understand that last sentence. You're saying it's your opinion based on what we just talked about that none of the water supply systems at Hadnot Point, at Holcomb Boulevard or Tawara Terrace were contaminated on October 31, 1980?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. October 1, 1980.

A. Yeah. I indicated that you had no significant contamination in any of those systems on October 1, 1980. That's what that reports.

MS. O'LEARY: If we've been going for a little over an hour. So if there's point where we can take a short break.

MR. DEAN: Now is a good time. I'm fixing to go to another subject.

THE VIDEOGRAPHER: We are off the record at 1455.

(Recess from 2:55 p.m. to 3:06 p.m.)

THE VIDEOGRAPHER: We are on the record at 1506.

BY MR. DEAN:

Q. Can you go to Exhibit 3. Actually -- yeah, Exhibit 3. Let me get the right page for you. I want to talk about your opinions for Hadnot Point well 634.

Do you have independent opinions on contamination analysis of HP-634 as far as its start date of contamination, contamination at all? Do you have independent opinion on that or do you rely on Alex Spiliotopoulos?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: I have reviewed independent data for well 634, and it is in my opinions. I describe that.

BY MR. DEAN:

Q. What is your opinions with respect to contamination at HP-634?

A. It is in my report. So I can go there.

Q. Please if you don't mind.

A. If you permit me to find it.

Q. I'm trying to get there myself. I believe it's page 530. Page 531, bullet point -- I guess it's the third bullet point down, it says, "Supply well HP-634 was not contaminated with TCE."

Do you see that?

A. I see that, yes.

Q. And what's the basis of that opinion?

A. The data.

Q. What data are you referring to?
A. The available data.
Q. It's in your report. Let's just read it together. You're saying that there's two samples taken in December of 1984 after the well was shut down and, two, after wells shut down in '86 and '91. But on those first two, December 4 and 10th they were nondetects.
MS. O'LEARY: Object to form and foundation.
THE WITNESS: For TCE they were nondetect.
BY MR. DEAN:
Q. Do you know what the nondetected level was?
A. By memory, no, but we have to go back to the data sheets.
Q. Do you know, did you do any work or research or data analysis for the December 4, 1984 sample at HP-634 to determine whether or not that was a good sample?
MS. O'LEARY: Object to form.
THE WITNESS: I looked at what is available for the results on that date, and my recollection is that it's some information from

the laboratory.

BY MR. DEAN:

Q. Do you know whether or not that December 4 sample was contaminated in any way?

A. I would have to go back to the data sheets to answer that question if it is. But I recall for TCE, it was nondetect as I recall it. I would need to see the datasheet to confirm.

Q. I think this is in your report. Table C7 report ATSDR, let's see if that's in here.

According to your -- I'll show you the form the data in just a second. I'm making a copy of it. But according to your bullet pointed note there, there's only one sample that shows a positive result for TCE, which was taken January 16, 1985 at 1300 micrograms per liter; right?

A. Out of the five samples taken during the period, yes, that's my understanding.

Q. But you're saying -- what's wrong with that 1300 micrograms per liter measurement taken in -- reported out January 16, 1985?

A. So you mean the one with 1300 reported?

Q. Yes, sir.

A. Well, that particular sample was part of a questionable sample sets that contained broken bottles based on what I have reviewed.

Q. And do you believe that the sample that rendered the 1300 microgram per liter measurement, was that sample vial broken?

A. Again, I will have go to look at that. There were several samples broken.

Q. What about the sample for 634, was that vial broken?

A. I have to back to look at that information that I cite in my report. And I want to say for these type of samples, for those type of analytical means, you always -- the protocol is to take more than one flask or one sample, so typically two or three.

Q. But you believed that somehow because some of the vials collected January 16 that that means that the vial for 634 was somehow comprised?

A. It is a QA/QC flag. So the data should be marked as such. You a problem with that shipment. And all the samples could have been contacted by the broken vials in the package, if you wish. And typically the flag, you say, well, you should resample.

Q. Have you seen any documents to date that indicate specifically which vials were broken and what the condition of the 634 vial was? Have you seen any documents or data that gives you that information?

A. I recall two or three different sources there. And I do not specifically recall the content of those. You'll have to show them to me.

(Hennet Exhibit 15 was marked.)

BY MR. DEAN:

Q. We'll show you Exhibit 15, and this is the data for -- and for the record, it's CLJA_WATERMODELING_01-33723 through 3726. And on page -- I'm going to to this referring to the Bates-stamp 3724. So it's the second page.

Do you see the data reported out for HP-634?

A. Well, this is, I believe, from the ATSDR report.

Q. Correct.

A. And this is not the documents I was referring to. I refer to original documents that basically describe the sample set.

(Hennet Exhibit 16 was marked.)

BY MR. DEAN:

Q. Now, I'm going to show you Exhibit 16.

This is report # 7.

MS. O'LEARY: Do you have a copy of for me of 16?

MR. DEAN: Did I hand him two copies?

MS. O'LEARY: I'm not sure. The last one I got was 15 which was Table C7 from the ATSDR report.

BY MR. DEAN:

Q. This is report 7 from the JTC Environmental, December 18, 1984 report, CLJA_NAVLANT-563489 through the 563498. If you turn to page 3495, you see that that particular Navy sample for HP-634 was received on the 12th and analyzed December 14. And that's when they got the chloroform, the 44V methylene chloride 130 reading.

Do you see that?

MS. O'LEARY: Object to form.

THE WITNESS: I see that.

BY MR. DEAN:

Q. Do you remember that when that -- let's go to something else first.

(Hennet Exhibit 17 was marked.)

BY MR. DEAN:

Q. I show you Exhibit 17. That first one,

Exhibit 16, it's listed as a part of your reference materials; correct?

A. I believe so.

Q. I'll show you just page 9 of your reliance materials, which are Exhibit 1 -- Exhibit 10 is your supplemental reliance materials. Do you see just the two reports I've handed to you, Exhibit 16 and 17, do you see where you listed both those reports in your reliance materials, the highlighted ones that I've got there for you?

MS. O'LEARY: What do you have highlighted?

MR. DEAN: Report 7, Exhibit 16 and the report 17 which is Exhibit 17.

THE WITNESS: Stay with me.

BY MR. DEAN:

Q. Exhibit 16 is the report 7; right?

A. 563.

Q. Do you see it says test report number 7. That's all you got to look at on the top. Do you see it on Exhibit 16?

A. I see that. It says Report # 7, but the a Bates-stamp numbers for some reason --

Q. Don't worry about Bates numbers. Don't worry about Bates numbers. Okay? Exhibit 16 is test report # 7 that's referenced that in Exhibit 10 of your reliance materials on page 9; correct?

A. It's not the same Bates number. But it has the title report number 17.

Q. Now go to Exhibit 17 laying there. Top left-hand corner it says it's report number 17 Enclosure. Actually if you'll turn to the second page that would be the easiest. Turn to the second page. And it says at the top report 17.

A. It says report number 17.

Q. And is report 17 in your reliance materials on page 9?

A. I believe it is.

Q. Now, on Exhibit 17, if you turn to the page -- the easiest one for me to use is the CLW number 5611, so about a third of the way in. Do you see the large CLW number?

MS. O'LEARY: That would be the Bates at the bottom CLJA_WATERMODELING_09 and then 423234.

MR. DEAN: Mine is cut off. Sorry I couldn't give you that one.

BY MR. DEAN:

Q. Do you see on 5611 the sample received

January 18 reported out at 1300 microgram per liter on that page 5611?

A. Can you repeat that?

Q. Do you see at the bottom besides 87V, TCE is reported out at 1300 on the sample for January 18?

A. Yes. I see that.

Q. Do you see anything on this lab sample log, page 5611, that says anything about that sample being compromised or there being some sort of an issue with that sample?

A. Not on this sheet.

(Hennet Exhibit 18 was marked.)

BY MR. DEAN:

Q. I'll show you Exhibit 18 and ask you if you've ever seen that document before today. I will tell you it's not listed in your reliance materials as a part of the ones you specifically set out. It's probably covered in the catch-all.

My question is just: Do you as you sit there today remember reading this chronology?

A. Those documents seem familiar, but there are several chronologies in the record that look about the same. So I think I have seen this.

Q. It's not again listed specifically in your reliance reference materials, although it's probably in a catch-all at the end in those others, and I just was not certain of whether or not you've ever considered this document and considered it for your opinion in this case. That's my question.

MS. O'LEARY: Object to form.

THE WITNESS: I have looked at many documents, and this is probably one of the one I looked at because I do remember documents that looked like that that were basically chronologies. I don't think they are more than one to my recollection.

BY MR. DEAN:

Q. Now, do you see that January 16, 1985 entry? Actually let's go back up. So December 4, which was the date we were talking about earlier shown on the summary that had a nondetect remember, it says, "Sampled Hadnot Point water plant raw and treated water, plus wells 601, 603, 608, 634, 637 and 642 because of their proximity to the 602."

Do you see that?

A. I see that.

Q. And it also says on 10 December, a

couple lines down, "Sampled HP treated water, plus wells 601, 602, 608, 634, 637 and 642."

Do you see that?

A. I see that.

Q. 14 December, "Received the result of the 10 December '84 sampling. Treated water levels dropped. Wells 634 and 637 previously showing nothing showed significant levels of methyl chloride. 634 and 637 were shut down."

Do you see that?

A. Yes. It is methylene chloride. Yes.

Q. I'm sorry. Now, I think in your report your opinion is that as of December 14, 634 has been shut down and no longer operating; is that right?

A. 634 was shut down because of methylene chloride detection.

Q. And it stayed shut down. It was the never turned back on as far as you know?

A. It was not returned to service as far as I know.

Q. I don't know exactly what page that is. It might have Dr. Spilotopoulos' report.

But as far as you know as you sit here today, you don't know of any information that 634 was turned back on after that December 12?

A. My recollection is that it was shut down. It was said shut down temporarily, but I saw no indication that it was ever put back in service.

Q. Let's look at that. Do you see the next entry about two down, it says 16 January 1985? Do you see that entry?

A. Yes, I do.

Q. And we've already established from Exhibit 17, the JTC report, that 634 was, in fact, tested on January 16; right?

A. Can you show me which?

Q. Exhibit 17 or you can go to Exhibit -- Exhibit 17, January 16, 1985, 634 was tested.

MS. O'LEARY: What page is that?

MR. DEAN: 5611.

BY MR. DEAN:

Q. Page 5611, 634 was a well that was sampled on the 16th, the sample received 18th, and it was reported out on the 28th. Do you see that?

A. Where is the date of sampling here on this page?

Q. Do you see at the top of 5611 it says the Navy received the 634 on January 18?

A. Yes, but that's not the sampling data.
Q. Hold on. Bear with me. If you go to exhibit -- go to Exhibit 15, which is this document, the chart. Do you see on the second page besides or down there where it says the sample date for Hadnot Point 634, it lists 12/4, 12/10 and January 16, 1300 micrograms per liter?
A. Two more dates later. Yes. This is from ATSDR.
Q. Correct.
A. This is not primary source of information.
Q. Sir, the primary source of the information for the 1300 reading right there shows that the Navy received the sample. I'll give you it doesn't say when specifically on that page the sample was taken. It says the Navy received it on the 18th. The result for TCE on the bottom right-hand corner is 1300, isn't it?
A. That's correct, but it doesn't give me a sampling date.
Q. I understand it's not there, but we can get that date, assuming it's accurate, from Exhibit 15; right?
A. Assuming that the ATSDR is accurate.

There were a few typos in the ATSDR sampling dates.

Q. Also on Exhibit -- the chronology, Exhibit 18, on the first page, CLW 4546, beside 16 January 1985, which is the same date that ATSDR listed in their report as the sample date, does it read, "Sampled all operating wells for Hadnot Point and Holcomb Boulevard water plant (HB). 37 wells"?

Did I read that correctly?

A. You read that correct.

Q. So we got two. That's the original source or that a source, not the original. That's a source of the date of January 16 that all operating wells including HP-634 were sampled; right.

A. It doesn't say January 16 HP-634 on what you showed me.

Q. It says, "All operating wells were sampled that day."

Do you see that?

A. That what it says.

Q. 634 was sampled on that day.

MS. O'LEARY: Object to foundation.

THE WITNESS: Could be.

BY MR. DEAN:

Q. The history says it was operating that day; right?

A. That's the words that is being used in this.

Q. So my question is: Did you disregard that fact or not consider that fact when you issued your opinion saying that the well shut down on December 12, 1984 and never went back into service?

MS. O'LEARY: Object to foundation.

THE WITNESS: I did not disregard that. I did look at the 37 wells that were sampled, and it included both operating wells and the wells that were shut down. For example, 602 was sampled. It was shut down. So I think the person who wrote this narrative just basically probably used the incorrect word because what I did is I sampled all water supply well that they could sample. That's my interpretation of that, because when I look at what was actually sampled, it included wells that were not on.

BY MR. DEAN:

Q. Do you know if there's any other evidence that well 634 was, in fact, operating on

January 6, 1985 other than the document you and I just looked at, the chronology, 4546, CLW 4546? It's Exhibit 18.

A. Well, I have searched for that. There is no document I could find that would say well 634 after it was shut down because of methylene chloride was ever restarted. You are quoting something that is out of the -- not of the time, but somebody just did a narrative.

And when they say all operating wells were sampled, 37 wells, I looked at the data from those resampling, and it does include wells that were shut down, but they could be sampled because technically because they could be sampled.

Q. Did you find any other historical documents or any other information about operation of 634 when you were doing your in-depth document review in order to base your opinions other than you now believe you might have seen Exhibit 18?

A. Yeah. My memory come back. I have seen this. And then I just went to look at all the wells that we sampled, and those included wells that were in operation or operable as well as wells that were closed at that time.

(Hennet Exhibit 19 was marked.)

BY MR. DEAN:
Q. Let me show you Exhibit 19. The Department of Justice has retained you as an expert in this case; right?
A. Yes.
Q. And they are defending the United States; right?
A. Pardon me?
Q. That they are defending the United States in this litigation?
A. That's the role of the Department of Justice in this case, yes.
Q. And the location that's at issue in this case is Camp Lejeune, North Carolina, which is a Marine base under the jurisdiction of the Marine Corps which falls under the Navy.
A. That's my understanding. I have not seen documents that state specifically that. I have not looked for that.
Q. Do you believe that the United States Marine Corps, if they were to prepare a history that applies to operation 634, that the Marines would be accurate and truthful in that chronology?
MS. O'LEARY: Object to foundation.
THE WITNESS: As I mentioned, those

chronologies are put together by somebody who was probably task to do that. That doesn't mean that it is absolutely correct. I have noticed several times where things are contradictory in the record.

BY MR. DEAN:

Q. Do you trust Marine Corps chemists?

MS. O'LEARY: Object to foundation.

THE WITNESS: What do you mean by trust?

BY MR. DEAN:

Q. Do you not believe or trust a Marine Corps chemist?

MS. O'LEARY: Object to form and foundation.

MR. DEAN: Let me withdraw that. A little argumentative. I'll object to my own question and ask a different way.

BY MR. DEAN:

Q. Do you have any reason as you sit there today right now to distrust, not believe, not feel comfortable with a United States Marine Corps chemist analyzing the operation of these wells in 1989?

A. 1989? Everybody do the best they can. I don't see malfeasance, if that's what you mean, but it is not to the exclusion of sometimes some verbiage that is not correct for litigation or basically some error. Human error happens, but -- I want to finish -- I don't see anyone who's is trying to basically say something that I didn't think was the way they said it.

But I do not cherry pick what I look at. I look at everything. The basis of me as a professional rendering an opinion it's not based on the cherry picked one piece or one sentence here ignoring the other ones. I am taking the entirety of that, and then I make my opinion.

Q. And your opinions are based on the stuff that's been provided to you or that you've developed or researched and located, produced to you. That's where you get all your information; right?

MS. O'LEARY: Object to form.

BY MR. DEAN:

Q. Let me ask a different way. Did you get any information, did you get any documents directly from the Marine Corps or the Navy, or did you get all of the documents and information supplied to you by the Department of Justice?

A. My understanding as far as documents, base-related documents that they basically all came through the Justice Department. But if you have a newspaper article, I may have read that, but it was not coming from the Justice department.

Q. Understood. I'm going to show you Exhibit 19. Exhibit 19 is a memo from a supervisory chemist Elizabeth Betz, dated 11 April 1989. Its subject says Water Monitoring Related to the Installation Restoration Program at the top.

Do you see that?

A. I see that.

Q. This document is not listed in your reliance materials in any of the call-outs through page 22, although it could be covered in some of the other catch-alls.

My question: Do you, as you sit there today, specifically remember reviewing a 1989 Marine Corps water monitoring program history document?

MS. O'LEARY: Object to form.

THE WITNESS: I believe I have seen this. At least it looks like something I've seen in the past.

BY MR. DEAN:

Q. And do you see on the second page, 1819, it says Installation Restoration Program Background Information? Do you see that?

A. I see that.

Q. And if you go down to line 6, that very similar sentence where it says, "On December 4, 1984 the Hadnot Point water treatment plant's raw water and treated water was sampled as well as any drinking water wells within a mile of Hadnot Point fuel farm or Building 202. The building numbers sampled were 601, 603, 608, 634, 642."

Do you see that?

A. I do see that.

Q. Then the results are received on December 6. In item number 8, it says from October 31 -- excuse me. Does it say, "From 10-31 December 84 duplicate and quality control samples were run to confirm the presence of TCE, DCE and PCE in the wells. Wells 634 and 637 on a second sampling shows methyl chloride. The wells were temporarily closed until it was determined that the methyl chloride was probably a laboratory contaminant."

Do you see that?

A. I see that.
Q. If you turn to the next page, paragraph 9, Ms. Betz notes "On January 16, 198 37 wells serving the Hadnot Point and Holcomb Boulevard water plants were the sampled."
Do you see that?
A. I see that.
Q. Item number 13, moving forward, says, "On 1 February 1985, the 31 January 1985 samples showed that there was still a contaminated well operating in the Hadnot Point system. The results of the 16 January '85 sampling were phoned into Natural Resource and showed high levels of TCE in 651. Well 651 is located on the backside of DRMO's disposal storage lot. It was not initially sampled as being in proximity to a NACIP site. It had the highest levels of TCE found. The concentration was in the 17,000 to 18,000 parts per billion range. Well 651 was shut down."
Can you read what the record what it says on February 1, 1985 about well 634?
A. Well, we're talking back to this 1300.
Q. Can you read into the record the rest of the paragraph I just read beginning well 634, sir.
MS. O'LEARY: Object to form.

THE WITNESS: "Well 634 showed TCE also and was shut down."

BY MR. DEAN:

Q. That document says 634 continued to run some point in time after it was temporarily closed, put back in service the end of December, middle to end of December, and it ran until February 1, 1985. That's what that document says; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: You have to help me here. I don't see where says that 634 was operated for the water simply.

BY MR. DEAN:

Q. Well, it says on the 1st of February 1985, it was shut down. That's the sentence you read. And if it shut down, it means it was operating before it was shut down.

A. No. That's one interpretation of this. But my interpretation based on everything I have looked at is -- remember that this chronology here was done basically four years or five years after the fact. So it's basically some rehashing of things. I put more credential to basically documents that are close to when things happen or when things happened.

Q. Well, this is 1989 and the other document is February 26, 1985. If you go look at Exhibit 18, tell me the date it says that that chronology was prepared.

MS. O'LEARY: Object to form.

THE WITNESS: That chronology we talked about was February 26, 1985. This one --

BY MR. DEAN:

Q. 30 days later.

A. That one. And this one is five years later.

Q. Four years later and it has the same wording, for the most part, of the wording that was done when it was created 30 days within that well -- actually, the well was shut down February 1. So that's 25 days after 634 was shut down. This chronology was prepared. Isn't that sufficiently close in time, sir?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: No. I think you are trying to argue with me. But the information I have seen and reviewed was that well 634 was shut down in December after methylene chloride was

reported in the water from the well.
BY MR. DEAN:
     Q.   And your opinion is it was never started back up?
     A.   I'm not finished. I'm not finished. Then I looked for information that would just support what you say, that well 634 was basically reused for the water supply. And you have information from the time that shows you that that well was not on. And that information is given in my report for the period November -- for 69 days, November to basically February 5, 1985, that period of time. And well 634 after this period of shutdown on December 10 or whatever that was, was not on. And that is contemporary information that tells you which wells were on and which wells were off. And that I rely as being primary indication and support for my opinion and deduction and conclusion that well 634, once it was shut down, was not restarted for the water supply.
     Q.   We'll circle back to that in a minute, move onto another subject.
          (Hennet Exhibit 20 was marked.)
BY MR. DEAN:
     Q.   I'll show you Exhibit 20. Do you see

that Exhibit 20, which is CLJA_WATERMODELING_09-427825 through 427827 is a meeting, 2/27/85 meeting, the day after the chronology document is dated, Exhibit 19.

A. Are we on 19 or 20?

Q. I think we're on Exhibit 20. I was referring back to 19 because it's got that date at the top. The chronology is 18.

Have you seen this document before?

A. I believe I did.

Q. It's not listed in your reliance materials specifically as a call-out. It could be covered in some of the catch-alls at the back.

My question you to is: Do you know for certain one way or the other in forming your opinions in this case, did you, in fact, review this document or not?

MS. O'LEARY: Object to form.

BY MR. DEAN:

Q. If you don't remember, tell me. But if you remember, I'd like to know.

MS. O'LEARY: Same objection.

THE WITNESS: This document looks familiar to me. I believe I have seen it.

BY MR. DEAN:

Q. If you turn to the second page, do you see on the page 826 it is Wilmington Regional Office. It's got a stamp February 7, 1985 in the right corner. Do you see that?

A. I see that.

Q. And at the top it says Hadnot Point Water Systems. There's a location line across the top with different dates to the right. Do you see that? So the locations are up and down the left side, and the dates are across the top on the right.

A. That I see that, yes.

Q. And if you go down to the bottom, in the middle, do you see the section that says "Wells out of service and could not be sampled on January 16, 1985"?

Do you see that section?

A. I do see it.

Q. They list 610, 615, 654 and LCH 4006. Did I read that list correctly?

A. I see that.

Q. 634 is not listed there as being out of service, is it, sir?

A. It is not listed there as being out of service.

Q. On a report generated or received on February 27, 1985; correct?

MS. O'LEARY: Object to form.

THE WITNESS: That's correct. And this is one piece of information I have looked at.

BY MR. DEAN:

Q. And you discounted and didn't -- before we go there, do you see the information for the vials in the list under 1/16? Do you see there's a 1/16 date. Then there's some results listed under it.

A. I see that.

Q. And the location is over along the left side. Would you agree with me that this is additional information that shows that samples were taken January 16 because under January 16 next to well 634, out to the right is that same reading we looked at before, 1300.

A. I see that.

Q. Do you agree with that?

A. Yes. And if I may elaborate on this, the meaning of what you read in the record that wells out of service and could not be sampled. Now, if you look at the wells that were sampled and you go, for example, from the top, Building 20, Building 20, well 601, well 602, 603, 608, 634, 637, 642, 651, all of those wells were sampled. All of those wells were sampled.

Those wells sampled, basically some of them were not in service. And then you have the list of the wells that were sampled.

Q. 16 is not at the top.

MS. O'LEARY: Object to the foundation.

BY MR. DEAN:

Q. 16 is not listed as a sample taken because it was out of service, nor was 615, nor was 654, nor was LCH 4006. Those are noted listed at the top on this document.

A. I would like to answer, and listen to my logic. You try and pick the one you want, but listen to what is important here. Let's take, for example, well 608. Well 608 says for 1/16 it was broken. You read that; right?

Q. Yes, sir. I can read.

A. Does that mean it was sampled? I conclude that it does mean it was sampled. Well 608, was it an active well? No. It had been had shut down before. It was never restarted, but it could be sampled. In my evaluation of this, I made the same conclusion for 634.

Q. But this says on its face that this along with the other two documents I showed you, shows that 634 was, in fact, pumping, operating, when the samples were taken on January 16, 1985 as well as all the way through at least February 1, if not February 27 when this document was prepared.

A. No. What this means is that 634 could be sampled like 608 could be sampled. We know that 608 was not in service. And what you made me read earlier is that wells out of service and could not be sampled outside those four.

What is meant by that is those you could not sample. Sometimes it's because you do not have a pump that function anymore or the well has been probably abandoned, so it could not be sampled.

Now, 608 was abandoned before, but it was sampled as indicated by the data. 634, I saw nothing that says that 634 was restarted after it was shut down because of methylene chloride.

Q. I just shown you three documents. I'm not going to argue with you anymore about it.

I'm just asking you: Does that change

your view with regard to whether your opinion is correct that 634 was shut down temporarily January 12 and was thereafter was restarted?

MS. O'LEARY: Object to form.

THE WITNESS: And I explained to you that you are reading words in a wishful manner for what you try to express. And I am explaining to you that basically I have not seen any indication that well 634 was restarted for service, but it could be sampled similarly to well 608 for example, which we know for sure was never put back in service. And by the way, the same is true for well 602.

BY MR. DEAN:

Q. What is your basis to say that 634 was shut down December 12 and never turned back on? What is the basis for that statement?

MS. O'LEARY: Object to foundation.

THE WITNESS: The well was shut down at that time because of methylene chloride. And I found no indication that it was put back into service. And the fact that you are trying to make me admit that because it was sampled on January 16, that means it was in service.

You have plenty of more direct evidence

that shows that 634 was not restarted. And I mentioned before the document that shows the wells that were on and the wells that were off between November -- sometime in November all the way to February 5, 1985. By November I mean November 1984.

(Hennet Exhibit 21 was marked.)

BY MR. DEAN:

Q. We're going to look at it right now. Now, in your report -- I'll show you Exhibit 21. I blew it up. You've seen that chart before. I think that's what you're referring to; right?

A. That's correct.

Q. And you took Exhibit 21, which is an operational monthly report of when these wells were all -- between November 28, '84 and January 6, '85; right?

THE WITNESS: That's right. This is independent data, if you wish.

BY MR. DEAN:

Q. That you believe shows that this -- do you think when this document was created, Exhibit 21.

MS. O'LEARY: I'm sorry. I have a foundation objection. I think you said January 6, '85. I think it goes to February 5, if you look at page 2.

MR. DEAN: I'm sorry. You're exactly right. My apologies.

BY MR. DEAN:

Q. This chart for all these wells gives November 28, 1984 and continues through February 5, 1985; right?

A. That's correct.

Q. And you took that chart and you've created an Excel spreadsheet, and we'll talk about it later on, but you used that spreadsheet to then do some calculations and come up with percentages of operation time at these wells; right?

A. That's a basis for that, yes.

Q. So this is not a report. Someone created a summary after they went and looked at some records to create this well operational history document; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: Somebody working there did this.

BY MR. DEAN:

Q. What did you do to ascertain or investigate whether the data or the information about what months shown on this chart these different wells were operating? What work did you do to verify that this chart was accurate before you created your own chart?

A. Well, the chart -- you have information for the well we know were shut down. Let's take 634 off the table now. 602, 608, we know when that well was shut down. And we have some others. By memory I don't remember them all.

But those wells were basically but out of service, and that's documented. And they were never restarted. By memory 602 608 are the ones I remember right now. There are probably some other ones. And when you look at this chart, one of the things that I checked was, right, is this consistent with that information. And it is. So 602 for example, I know that it was shut down before November '84, and it's never on.

608, I know that it was shut down approximately in early December, and it was never on. All the ones that were contaminated, once they discovered the contamination, they shut them down.

Same for 634 now. 634 basically was never on, was never on at all after December,

December 10. And it was off a few days before because it was off. But it was never put back on all the way to February 1985.

Q. I let you finish. I let you finish. So let me ask a question.

A. Let me finish then. So this to me is important data in that context, because it's not somebody like ASTDR, like me or anyone else who just generated this information.

Q. My question was: You rely primarily on Exhibit 21, this chart someone created based on some other information to create your chart on page 418 in your report; right?

A. I basically base what have in my report on this, and I made it to fit on one page.

Q. Second question, you mentioned some data you conferred with to verify that the information in the chart is accurate.

Do you remember what you were referring to?

A. I thought I explained that. You have information in the record that, for example --

Q. Be specific. What information are you referring to that you conferred or reviewed to determine that you felt this chart was accurate?

That's what my question is.

A. For example, well 602, remember this chart are for the wells that are actually used for the water supply. They're water supply wells when you have an X that were in use to supply the water. Now, I know from the record, for example, well 602 was contaminated but was shut down.

Q. Let me stop you there. I don't know what you're referring to. You just say the record. I need to know what documents you're relying upon that you claim you reviewed to confirm that this chart was accurate.

MS. O'LEARY: Object to form.

THE WITNESS: They are documents in the record that I reviewed that basically give you the date when 602 was --

BY MR. DEAN:

Q. Can we agree we'll move on. As you sit there, you believe there's records. You believe you reviewed something, but you can't cite to them specifically to me right now?

A. By memory I am describing those, but I cannot just all of a sudden present them out of my nose.

Q. So on Exhibit 21, the chart, beside 634 it shows it was operating on December 28 and 29 and it shows it was operating December 2, 3 and 5, and then there's nothing for it throughout --

A. That was too fast for me. Can you repeat, please?

Q. For 634 it shows only on the chart that 634 was operating November 28, November 29, February 2, 3, 4, 5 and 6, and it stops. If you turn and look all the way across that, it shows it wasn't operated the rest of December, wasn't operating in January. And on the back, if you go to 634, it doesn't show it operating at all in January or February.

MS. O'LEARY: Object to foundation. I think you just misspoke and February when you meant December.

BY MR. DEAN:

Q. The well did not operate at all in December according this document or January or February, and that's where you got your information it must have been shut down and not come back on; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: That is consistent because

if it were to have been used, it will be represented with X on this chart, and it was not.

BY MR. DEAN:

Q. Then, sir, go back to Exhibit 20 for me. It's the handwritten memo page.

A. Yes.

Q. I think you missed a document. If you look at page 2, that analysis, if you look at well 634 under the date 12/10, what is the 130F?

A. F stands for methylene chloride.

Q. Out beside both 12/4, 12/10 you have this 130 reading; right?

MS. O'LEARY: I'm sorry for which well?

BY MR. DEAN:

Q. Well location 634 there's a methyl chloride finding on a sample taken on 12/10; right?

A. Methylene chloride, yes, on 12/10.

Q. And in order to obtain that sample, the well is operating; right?

A. It doesn't mean it was operating. It means it was sampled.

Q. Well, wouldn't you want to sample it when the well is operating?

A. Actually, you sample when you can

sample. It doesn't have to have the well operating. By operating, I mean providing water to the water supply.

Q. If this chart you created on 418 that you pulled from Exhibit 21, the historical summary chart --

MS. O'LEARY: That's 418 of Exhibit 3?

MR. DEAN: Yes.

BY MR. DEAN:

Q. You'd need to rethink your opinions, wouldn't you? If this chart is wrong, Exhibit 21, for which you created 418 and did some calculations, if his chart is wrong, then your opinions with regard to this information and calculation of these well operational contributions by percentages, those opinions would be wrong, wouldn't they?

MS. O'LEARY: Object to form.

THE WITNESS: This is a major piece of information that I considered. It's not the only one.

BY MR. DEAN:

Q. I understand. But what if it's wrong? What if this information you thought was accurate is wrong? Would you please agree with me you

would need to go back and look at your opinions?
MS. O'LEARY: Object to form.
THE WITNESS: You're asking me to speculate that this is wrong.
BY MR. DEAN:
Q. I'm saying I want you to assume it's wrong.
A. If you assume anything is wrong, if it is wrong, then I would consider that and see if it affects my opinion or not.
Q. What if some of these wells that shows they're not operating on this chart are, in fact, operating. Wouldn't that call into question this chart that you relied upon for your calculations? Yes or no.
MS. O'LEARY: Object to form.
THE WITNESS: That depends which information you would show me. Is that information that a well was sampled? For me, if you show me information that the well was sampled, it doesn't mean it was actually being pumped through the water supply at the time.
BY MR. DEAN:
Q. Let's relax and go to something else.
A. Can we take a break sometimes for

relaxation? I can wait a little bit more, but at some point, my coffee is working.

THE WITNESS: We've gone a little over an hour.

MR. DEAN: I'm fine taking five or so minutes if we could.

THE WITNESS: Five minutes is fine.

MR. DEAN: Let's take a break.

THE VIDEOGRAPHER: We are off the record at 1610.

(Recess from 4:10 p.m. to 4:19 p.m.)

THE VIDEOGRAPHER: We are on the record at 1619.

BY MR. DEAN:

Q. Can you pull back out your handwritten note, please, sir, Exhibit 11.

A. Got it.

Q. And also out beside your report. We're going to go to page 5-7.

A. Can you repeat, please?

Q. In your report page 5-7. We're talking about volatilization losses at Hadnot Point water treatment plant; right? On Exhibit 2-4 you did some calculation work?

MS. O'LEARY: I'm sorry. What's Exhibit

2? Excuse me. I'm just confused.

BY MR. DEAN:

Q. Page 5-7. It's also at the top called Exhibit 2-4 in your report; right?

A. Yes. Exhibit 2-4 is actually starting on 5-6.

Q. How did you do those calculations?

A. I applied a formula that I describe in an appendix to my report.

Q. And you started with 1000 parts per billion, and you say that the treatment process removes like 30 percent; is that right?

MS. O'LEARY: Object to foundation.

THE WITNESS: No. I did do everything in percent. I started at 100 microgram per liter and then basically taking 100 percent and then that's what you reduced.

BY MR. DEAN:

Q. I'm sorry. You took 100 percent, started with that. You took out 30 percent for treatment process; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: Where is that, please?

BY MR. DEAN:

Q. I'm trying to get you to explain to me how you did the calculations that are shown on Exhibit 2-4. Starting with 100 percent, how did you do these calculations?

A. In a manner similar to what was done in the AH report basically for the different elements, if you wish, of the storage treatment and water towers.

Q. You started with 100 percent. How much do you believe the treatment process reduces the volatilization losses?

MS. O'LEARY: Object to form.

THE WITNESS: As a whole?

BY MR. DEAN:

Q. Yes, sir.

A. For which compound?

Q. Did you apply a constant percentage of 30 percent to volatilization losses -- let me ask it this way.

Your overall -- on Exhibit 2-4 under TCE, your overall evaporative removal at the very bottom comes out to be 17.07.

Do you see that?

A. I see that.

Q. And if you add up these percentages, I believe, they -- do you know what they total?

MS. O'LEARY: Object to foundation.

THE WITNESS: I am not sure I understand your question. What this 17 percent is is the sum of the numbers that are in bold in the table for each chemical. This one in particular would be for TCE.

I want to add something. Those calculated results are for the system and do not include the operation of the recarbonization basin. I didn't put any value on that or it does not include other type of losses. This is evaporative losses as it is today, if you wish, or as it was when the recarbonization basin at Hadnot Point water treatment plant was not operating and the period of operation for the recarbonization basin when it was used for its purpose is unknown.

BY MR. DEAN:

Q. Thank you for that. We'll circle back to this in a minute. Let's talk about stressor periods.

A. Stressor periods.

Q. So the stressor period that ATSDR did in calculating and doing its water modeling, they use one month and look at all this well information; right?

MS. O'LEARY: Object to foundation.
BY MR. DEAN:
Q. They didn't do it daily?
A. The ASTDR model reported their results as monthly averages.
Q. Your chart we talked about earlier that you created is basically two full months?
A. This one?
Q. Yes, sir.
A. This is the information we have on which wells were on, which wells were off for a period of 69 days.
MS. O'LEARY: For the record, we're referencing 21?
MR. DEAN: Yes.
THE WITNESS: As shown in Exhibit 21.
BY MR. DEAN:
Q. Do you believe that it's representative of the true nature of well pumping and contributions of these various wells look at just one month?
MS. O'LEARY: Object to form.
THE WITNESS: That's not one month. It's more than two months.

BY MR. DEAN:

Q. Do you think that's sufficient to look at two months of data in December of '84 and January of '85 to analyze this issue about the contributions of these various wells to the pumping operations?

MS. O'LEARY: Object to form.

THE WITNESS: This is the data that is available. And I will comment on this in the sense that during this period of time, you had less wells available for pumping because some of them had been closed because of contamination, which implies that the other wells had to compensate for that. So that information probably exaggerates -- not exaggerates -- but gives a relative on and off period for the well that is -- you had less wells. So you had do operate the wells a little bit more to compensate for that.

BY MR. DEAN:

Q. Do you remember -- well, you made the mention about wells coming off line. You know that new wells were put in as well in this same timeframe; right? Have you seen that data?

MS. O'LEARY: Object to foundation.

THE WITNESS: I don't recollect the date

of new wells you would be talking about. But there were new wells, especially -- probably -- I do not know the date of the new wells by memory, but there were some, and I believe they were either for Hadnot -- Holcomb Boulevard system came later as far as Hadnot Point system was concerned.

BY MR. DEAN:

Q. If new wells were coming online hypothetically at a particular water treatment plant area, that sort of changes the history or what's going on with pumping because you're taking some off line and then you're bringing on some new ones. And if all this is occurring at the same time, it could artificially not represent the true history of what might have been taking place previously with respect is to certain wells.

Do you see what I'm saying?

MS. O'LEARY: Object to form.

THE WITNESS: I understand what you are saying and I understand you are talking about the tools in that sense, and nobody knows for the past except this period of time, which is data in my opinion.

BY MR. DEAN:

Q. And you think it's okay just to look at these two months even though at the same time of these two months, some wells are coming off and others are potentially coming on?

MS. O'LEARY: Object to foundation.

THE WITNESS: This is the data that is available.

(Hennet Exhibit 22 was marked.)

BY MR. DEAN:

Q. I'll show you Exhibit 22. Do you see that HP-622 -- let me just for the record, Exhibit 22 is CLJA_WATERMODELING_05-826091 through 826118.

Do you see that HP-622, Hadnot Point, new well 622 put in 5/19/82 the construction was completed. And on 6/1 there's a note that it went in service. Do you see that?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. Do you see that?

A. I don't see the last part, but you have to be patient with me.

Q. At the top, 5/19/83, construction completed. 6/1/84 it's in service.

A. I see that on this document, which is from the ATSDR, I believe.

Q. Right. But I mean they're citing -- let me ask you this: Do you not trust any of the historical information that was completed by ATSDR? And they've even footnoted where they got the information from, including Scott Williams, a June 6, 2008 email about well runs from Scott Williams.

Do you not just the information that's on this chart?

MS. O'LEARY: Object to form.

THE WITNESS: It is trust, but verified. I do not care who did what. I just go always to the original document that's close to that that and I can do, and I consider everything in between.

BY MR. DEAN:

Q. And the capacity for which this well was originally drilled and -- I don't know if certified is the right word, but capacity in gallons per minute was 323 at the top.

Do you see that?

A. That's capacity of the well at construction, yes.

Q. And well capacity test was performed again 9/5/85 it's at 320. 1986 it's 320. 1988,

290. 1988, 330. Do you see that? So it's consistently in the 320, 330 range; right?

A. For this well, it is.

Q. Now, if you turn to well 623, its construction was, I guess, about the same day, a few days off. May 25 it says it was completed. Its capacity was originally 360. It went in service August of 1984 according to operation records. 1985 it's got a well capacity test of 242.

Do you see that?

A. 1985 I see that 242 capacity.

Q. Turn to the next page Bates-stamp ending 97. The next one HP-628 (new). Do you see that new well went in 6/1/1984 construction completed. I guess there's some capacity reading of 160 in October 1984.

Do you see that?

A. I see that.

Q. Turn to the next well, well HP-660, that one, construction was completed in July of '83. Capacity test or whatever result in service 7/1/84, and it had I guess a capacity test previously at 151 in November of '83.

Do you see that?

A. I see that. That's the only capacity test.

Q. Agree with you.

A. And it was put out of service and later abandoned.

Q. Correct, 1994. HP-661, drilled in March of '83. In service August of '84. Well capacity test October 26, '84 was 280.

Do you see that?

A. I see that.

Q. And the last one is 662, last page ending 118. Says it was in service August of '83. Well capacity test October of '83 146. In service November 1984. Another well capacity test August of '85 at 168.

Do you see that?

A. I see that.

Q. So going back to my question, with all of those wells contributing, if you add them all up, over 988 gallons per minute in addition to the raw water supply, do you really think looking at the two months that you looked at still are representative of well cycling?

MS. O'LEARY: Object to foundation.

THE WITNESS: What we talked about on

this sheet, it tells you which wells were on, which wells were off. A well can be in service and but not being bumped.

BY MR. DEAN:

Q. Are you aware that November 30, 1984 the Navy received test results for 22 sampled wells, that well 602 was contaminated with benzene and that that initiated additional plans for further testing?

Do you remember that fact?

A. What was the date you mentioned?

Q. December 30, 1984.

MS. O'LEARY: Object to foundation.

THE WITNESS: I don't recall the exact date, but during that time, well 602 was shown to be contaminated and was basically shut down.

BY MR. DEAN:

Q. And that finding initially would have resulted in some additional testing and the well shut down?

MS. O'LEARY: Object to foundation.

THE WITNESS: Yes. The evaluation by the base went step-wise. They were trying to understand the problem.

BY MR. DEAN:

Q. For 602, and I believe it's in the records, there were well tests of 602 December of '84 and January '85 to locate the sources of contamination; right.

MS. O'LEARY: Object to foundation.

THE WITNESS: What do you mean by well test?

BY MR. DEAN:

Q. If you take a look at Exhibit 15, it's the chart with all the well tests summarized. It's Exhibit 15, ATSDR table. You can use mine.

A. I'd love to find mine so you can keep yours. Got it.

Q. Do you see beside HP-602 all of the testing that was done in November and December checking for contamination?

A. I see that. We're talking about chemical tests, I mean sampling and laboratory analysis of chemicals. Just before we were talking about capacities.

Q. Would those tests have affected pumping?

MS. O'LEARY: Object to the foundation.

BY MR. DEAN:

Q. Operations.

MS. O'LEARY: Object to form.
THE WITNESS: Test affected pumping? The sampling of a well may be done when the well is actually supplying water or when a well is not supplying water if you have a pump that works that is (indecipherable).
BY MR. DEAN:
Q. And that well was shut down, 602 was shut down after those contamination results were received in December of '84; correct?
MS. O'LEARY: Object to foundation.
THE WITNESS: My understanding, it was shut down because contamination was reported.
BY MR. DEAN:
Q. Would the fact 602 being shut down not impact pumping schedules for the other wells?
MS. O'LEARY: Object to form.
THE WITNESS: That depends if the well was in use or not. But, of course, you had one less well for the supply when they shut down that well.
BY MR. DEAN:
Q. When you shut down one well and you got so many people on base, doesn't it potentially impact pumping operations at other wells?

A. Yes, it does. You either have to pump the one you have for a longer time or you have to add wells.

Q. What information would you need, going back to Exhibit -- going back to the well service for the couple months that we've been talking about record that you used to create your chart, what records would you need to look at if you wanted to enhance this analysis to look and see about what was going on with well operations either before or after these time periods?

What sort of records would you need?

MS. O'LEARY: Object to form. This is Exhibit 21.

THE WITNESS: It doesn't exist to my knowledge, because I have looked for. And for the time prior to this, you basically have -- if any record, you basically have nothing all the way to 1942. You know the number of wells, more or less, that you had that were potentially in service. But you do not know if were they pumping or which group of wells were pumping.

(Hennet Exhibit 23 was marked.)

BY MR. DEAN:

Q. I'll show you what I'm going to mark as

Exhibit 23. This is some historical information about well capacity, operational history for HP-651. Do you see that? It's Bates-stamped CLJA_WATERMODELING_05-826112.

A. I see this is again from the ATSDR report.

Q. Yes, sir. You see like some of the other ones we've looked at, this information down at the bottom under the footnotes, you see there's footnote number three. For example, under that it lists all the data sources for which this information came including operation records.

Do you see that?

A. Number three?

Q. Footnote three.

A. AH Environmental Consultants, Inc., electronic communication, September 3, 2004.

Q. Now, you see that well was constructed in 1971. Do you see that?

A. I see that.

Q. It says it went in service in '72. And I think you got that in your report. Do you remember that?

A. Yes, I do.

Q. And it was originally marked with a

capacity or constructed with a capacity rating of 200 gallons per minute; right?

A. It was tested at the capacity of 200 gallons per minute with a set pump at a given elevation. We were given horsepower.

Q. 1977 well capacity test. It says 190. 1979, well test capacity test is the 167. 1980, capacity 178. 1981 it goes up to 232. 1983 it goes up to 239. And October 29, 1984, it's pumping at its highest rate, 242, according to this information; correct?

A. According to this, it is correct. And I have looked at the information for this well as well.

Q. And in your report, you opined that HP-651 is only operating 39 percent of the time based on your calculations and using the spreadsheet you created from the historical record of operation of these various wells, Exhibit 21; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: That's the data I have and that's the data I used.

BY MR. DEAN:

Q. If it's pumping all of those historical

timeframes where it was tested, does it really make sense that it's only pumping at 39 percent?
MS. O'LEARY: Object to foundation.
BY MR. DEAN:
Q. According to your calculations?
A. 39 percent of the time?
Q. That's right.
A. This is what the data supports.
(Hennet Exhibit 24 was marked.)
BY MR. DEAN:
Q. Now, again so you and I can see it better, I took your page 4-18, which is your Excel spreadsheet graph, and this is Exhibit 24. It's that same page out of your report. It says in your report under that chart Exhibit I-9, Frequency of Use of Supply Wells, November 28, '84 to February '85. And your conclusion, Supply well HP-651 was on for 27 out of 69 days, and that gave you an average pumping frequency of .39; right?
A. That's correct.
Q. And that is the basis for your opinion that this HP-651 was only pumping 40 percent of the time or thereabouts?
MS. O'LEARY: Object to foundation.
THE WITNESS: That's it, yes.

(Hennet Exhibit 25 was marked.)

BY MR. DEAN:

Q. Now, I'll show you Exhibit 25. And that document is an email from Anita Short at the top. It was a document found in the CAGE, identified as CLJA_USMC_CAGE_350325 through 345. You see the subject line of all these emails is the same. It says HP & HB Well Pumps: January to June 1980.

Do you see that?

A. I see that.

Q. Now, I didn't see this document listed on your reference materials specifically called out, although I think it might potentially -- while I'm doing that, just confirm if it's in the catch-all.

Do you remember ever seeing that document before?

A. I may if it is -- I may have seen it, but it seems to be indicating some water levels.

Q. In order to get these water levels, would you agree with me the well has to be pumping?

A. No. Some of them when you have a 3-foot water level, it's probably not pumping, 3-foot draw down as it's called.

Q. If you go to well 651, which will be on page 29, it's about the third page in, you see well 651, the January 1980, that first record, you say it says stat 25 foot, pump a hundred, draw down 75. Do you see that?
A. I see that.
Q. If you look across that, you see in February, March, April, May it shows all those lines filled out and it's pumping?
A. It's pumping sometime during that period of time; right.
(Hennet Exhibit 26 was marked.)
BY MR. DEAN:
Q. I'll show you Exhibit 26. This is CLJA_USMC_CAGE_67935 through 68188. This document is not listed in your reliance materials specifically. But do you see that it starts in 1978 at the beginning on that second page at the top?
A. I see that.
Q. If you turn about four pages in till you get to the well 651, do you see some operational data in the information there?
MS. O'LEARY: What's Bates-stamp?
MR. DEAN: CLJA_USMC_CAGE_67935 through

8188.

BY MR. DEAN:

Q. Right now I'm asking the question about age 7944. Do you see well data, monthly well pumping data for Hadnot Point, well 651, for July on that particular page, August, September?

A. This does not give you pumping values. It just tells you that during those months, the well that we are talking about were used. That doesn't mean they were used all the time. Of course, they were not.

Q. I understand, but that's some information that on that particular month that well 651 was operated at sometime. We don't know the exact date?

A. Exactly. But what this tells you as well is for 651 is that it was not operated in October of that year at all.

Q. Let's go back to -- where do you see that? Show me what page you're looking at.

A. We were looking at page 7944.

Q. I agree 100 percent. October it's not working at all?

A. At least it's not reported.

Q. Did you consider this information at all

in forming your opinions about what months --
scratch that.
If you look through this entire exhibit, do you see that it goes all the way through July of 1983, December?
MS. O'LEARY: Objection. Foundation.
BY MR. DEAN:
Q. Do you see on the last page, page 68188, is July of '83 to December of '83?
MS. O'LEARY: Object to foundation.
THE WITNESS: That page does not inform me on 651. But that page goes to December 1983 but for some wells at different places. So that's fine. I see you probably have it under Hadnot Point.
BY MR. DEAN:
Q. Here it is. It's going to be on page 68148, well 651. The previous page, 68146, began January of '83. Do you see that?
A. I am on 68146.
Q. Do you see 1983 Hadnot Point at the top?
A. I see that.
Q. And the next page, which for whatever reason, there's a Bates -- my next page says 68148.

MS. O'LEARY: That's what I have as well. I don't have a 7.

MR. DEAN: I don't know what's going on there at all.

BY MR. DEAN:

Q. But you see 651?

A. I see that, yes.

Q. January through June?

A. Right.

Q. July through December is on about three page over beginning page 54.

A. Yes. It goes all the way to December. And I believe if you follow the logic of this, it would be '83.

Q. So we have some information for all of those months, 1978 through January of '84 where well 651 is pumping. I'm not sure how many days. But it's pumping at least one day. And you didn't consider that evidence in forming your opinions that the well is only operating 39 percent of the time?

A. I have never said that well 651 was not a water supply well during the period 1972 until it was shut down in 1985. It was available. Those sheets are consistent with that, but I did not give you a frequency of use.

Q. Do you agree that if you took into consideration those operational months, it would expand potentially the time periods to consider for reaching your calculation of 39 percent using only two months versus five years of well operational history?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: I will re-answer. This information shows that the well was available for that period that is documented in this Exhibit 26. But that doesn't give you a frequency of use.

BY MR. DEAN:

Q. Now, let's go to something else, talk about water buffaloes. When you read Dr. Sabatini's report, you realized that Dr. Brigham had made a mistake about how the water buffaloes were filled back in the day as far as what hatch or location they were filled; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: I don't see what mistakes. My recollection is Dr. Brigham just showed water buffaloes, several types of water buffaloes that were used at the base at the time.

BY MR. DEAN:

Q. Well, Dr. Brigham assumed that all you water buffaloes were M107s or if they all -- if they had other models, that they were being filled through the filler neck; right?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. That what he says in his historical expert opinion report, that these water buffaloes were filled through the filler neck.

MS. O'LEARY: Object to form and foundation.

THE WITNESS: You have to show me where he says that because I don't recall that.

BY MR. DEAN:

Q. Well, you relied upon that up until the time you issued your report to support certain opinions about volatilization. And after Dr. Sabatini provided his report, you then went back out there February 11 and did your work including filling a water buffalo; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: When I made my calculation for the fill up of a water buffalo, I had a diagram of a water buffalo and I filled it up through the filler pipe for my calculation. And then I made that calculation. And then I just saw the expert report that rebutted my report by Dr. Sabatini in which he basically agrees with me on the methodologies. But there he just also included two affidavits that I had seen before that says that the water buffaloes, at least some of them, were filled up through the manhole. I understand that, and that one of the reasons I went back to the base to basically evaluate that.

BY MR. DEAN:

Q. When you issued your report in December 2024, December 9, 2024 when you issued your original report, did you do anything at that time to verify any of the data in Dr. Brigham's report?

MS. O'LEARY: Object to foundation.

THE WITNESS: I wrote my report.

BY MR. DEAN:

Q. Can you answer my question yes or no.

Did you do anything to verify his data when you first saw his report before you prepared yours?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: I did not do anything to verify Dr. Brigham report, which basically came at the same time as mine. And I made my calculation as I explained in my report.

BY MR. DEAN:

Q. In your report, you did your calculations based on Dr. Brigham's report saying that they were filled through the filler neck; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: You will have to show me where and what Dr. Brigham says about that if he said it as you tried to insinuate, that they were only filled up through the filler. I don't recall reading that. So you have to show me that, and I will be able to answer.

BY MR. DEAN:

Q. You assumed when you wrote your report on volatilization issues about the water buffaloes you relied on Dr. Brigham's report. And I can represent to you he says in the report they were filled through the filler neck, and that's what you have in your report.

MS. O'LEARY: Object to foundation.

THE WITNESS: You have to show me

Dr. Brigham's report where he says that because I don't recollect that specifically, not that it really matter for my opinion.

BY MR. DEAN:

Q. So you go back and you do this work. How does that either change your opinions about how these water buffaloes were -- the volatilization of the water buffaloes?

A. You are going to have volatilization losses when a water buffalo is being filled up.

Q. Let me ask you this.

A. I am not finished.

Q. Let me withdraw the question.

A. I am not finished.

Q. I'm withdrawing the question. It's my question. I'm trying to get us out of here on a timely basis. Okay?

Did you do any work before you issued your first report to that determine how long it takes to fill a water buffalo either through the filler neck or the manhole cover?

A. I didn't make a specific calculation because I didn't have time of fill up. But my understanding was that it goes relatively fast because we are dealing with big filling pipes or hoses, if you wish. They are not a garden hose. Those hoses are full pressure hoses that can deliver 100, 200 gallon per minute.

Q. You went back on February 11 and you evidently filled up a water buffalo with a hose because I've seen in it photos; right?

A. I did not fill it up myself. I witnessed the fill-up of a water buffalo by the base personnel.

Q. Did you time -- not time -- did you videotape the filling of the water tank?

A. I did not videotape it. I took many pictures as it was being filled up. And I did time the time it took to fill up that water buffalo at that stage.

Q. What did you use to record that time? A watch? A stopwatch?

A. I asked specifically counsel stopwatch. And I said start and at the end I say end. And I was on the top of the water buffalo taking pictures.

Q. Did you record somehow that stopwatch by the Department of Justice employee or lawyer to see if they actually started and stopped the watch when you told them to? Did you do anything to record this timing of the filling?

A. It was reported to me as 3 minutes and 23 seconds, which is consistent with whatever Dr. Sabatini says about filling up through a manhole.

Q. When you did this experiment or document the timing, did they fill it through the filler neck or the manhole cover?

A. It was filled through the manhole.

Q. And did you all tell him how to fill the water buffalo?

A. I did not.

Q. Did he stay on top of the water buffalo holding on the hose for the 3 minutes and 23 seconds to fill the water buffalo?

MS. O'LEARY: Object to form.

THE WITNESS: Who is "he"?

BY MR. DEAN:

Q. Whoever filled the water buffalo as shown in the photos.

A. Yes. There two personnel from the base, two Navy Marines. And one of them was basically holding the hose and filling up. The other one was basically handling the shutoff valve and shut-on valve. I was on the other side of the

water buffalo observing and taking pictures.
Q. Did you have an iPhone that you were taking picture on?
A. I think I took them with my company camera.
Q. Did you have the capacity, you or the DOJ lawyer with you, to record the video if you had wanted to?
A. Well, I took a lot of pictures of that filling up.
Q. Could you have videotaped it if you wanted to?
A. I was not permitted to videotape. I wanted to take photographs and I did. And for me as an expert for that, this is sufficient information to support my conclusions.
Q. My question is not that.
Did your phone have the capability or the DOJ's lawyer to videotape?
A. My private phone has that capability.
Q. So when you had the Marine stick the hose, did he hold it up at a certain level, or did he drop it all the way into the tank? How did he handle the hose?
A. My recollection, and that can be seen on

the pictures. Basically the hose is partially inside, but it's still under water. It is above the water level in the tank.

Q. Well, did he start with the hose all the way at the bottom and then pull it up as it comes out, or did he leave it in there and let the water buffalo fill up and then when it got to the top, pulled it out then? How did he handle the hose?

A. He was holding the hose, to the best of my recollection, and that's documented in the picture. The end of the hose, if you wish, was basically always above the water level in the tank.

I want to say one more thing. It is possible that some of the picture I took with my cell phone because at the time, there was some -- because it was cold and raining, if I recall, you get some fog on the camera I had. So I don't know if it was -- that's kind of what I recall. I wanted to put that in the record.

Q. Let's move to different subject. NRC review report issued in 2009, did you play any role in any aspect of the start of that report, assisting with getting -- identifying who might be a good person to be the panel?

Did you have any discussions with anyone, whether it be someone with the Marines or the NRC, a lady named Susan Martel whose deposition you read. Did you talk to anybody about the formation of that committee back in 2006, '7, '8?

A. I do not recall such discussion, and I don't know that person Martel you mentioned is. You suggested that I read that deposition. I do not know. You will have to show it to me.

Q. You don't remember reading Susan Martel's as you sit there today?

A. As I sit here today, I have read a lot of depositions and I do not associate names, this name, to anything that I have seen unless you were to show me the documents you are talking about.

Q. How many water modeling hydrogeology experts do you remember that served on that NRC committee panel?

A. I have no recollection or understanding of that.

Q. Let's talk about travel time of contaminants at TT-26. In your report 5-15 -- I believe your report is Exhibit 3 -- 5-15 you say it's 15 to 25 years travel time for PCE from the dry cleaners to TT-26; right?

MS. O'LEARY: Object to foundation.

THE WITNESS: Can you repeat, please?

BY MR. DEAN:

Q. Yeah. Let me ask you a question I forgot to ask you at the end of the last one about the water buffalo.

I didn't see anything. You haven't done any new calculation based on the observations you made when you were filling the water buffalo on 2/11?

A. I have not done calculations, but I have basically looked at some EPA information that gives information on, for example, when I saw the water buffalo being filled up with aeration, I say, well, the best comparison to that would be faster fill-up, but it would be much less aeration, if you wish, because I have seen bathtubs being filled up.

And I considered that, and I say, well, with the large amount of aeration that I observed when the water buffalo was filled up in 3 minutes and 23 seconds or so for 400 gallons, you have a lot of aeration. And I estimated that, yeah, substantial loss that is comparable to what I calculated for the strainer. That's basically -- I didn't do calculations, but I did for myself an evaluation of that.

BY MR. DEAN:

Q. So travel time for contaminants at TT-26, on page 5-14, you state, "The release of waste materials containing PCE at ABC Cleaners was gradual." Okay? Do you see that?

A. I don't see that, but I believe I say that. Can you tell me where it is?

Q. Second sentence in the last paragraph at the bottom. "ABC Cleaners started operations in mid 1954. The release of waste materials containing PCE at ABC Dry Clearance was gradual." Footnote 86. And you're citing to a North Carolina Department of Resources Community Development report by Rick Shiver.

Do you see that?

A. I see that.

Q. And then page 5-15, you opine in the bottom paragraph that the PCE travel time between ABC Dry Cleaners and TT-26 are in the 15 to 25-year range. And you've got a chart on page 5-16 where you -- the next page, Dr. Hennet -- where you illustrate in Exhibit 3-1 those travel times.

Do you see that?

A. Yes. That's an illustration. And details of this is provided as an attachment to my report.

Q. How did you choose those three travel pathways at 25, 20 and 15?

A. Well, I calculated the time it would take for the contaminant PCE dissolved in groundwater to travel to the well from ABC Cleaner, and I used as a basis a simplified setup which is the same as the ATSDR model used, the same layers, the same thickness of each layer, the same permeability in each layer and such.

And what I did as a hydrogeologist and a geochemist, I applied the fundamental equations of formulas of evaluating fate and transport when you don't have data to illustrate that basically you can get answers that are different from what ATSDR has done as far as the travel time that are as valid and even more in this case, because ATSDR made mistakes and errors in what they did at Tawara Terrace on the parameters.

I used parameters that were the same as in the Hadnot Point model, and I used to calculate the retardation for those travel time. I relied on the site-specific data that the ATSDR did not consider even though it did exist.

So nobody knows what happened in the domain where you have no data with any degree of reasonable scientific certainty. You have many ways that you can calculate travel times to arrive to a well.

The thing I want to say, in this case, you are trying to calculate travel times for a period of 30 years during which you have zero data for the contamination arriving at the well. And you have two or three years -- well, you have some data, and that data is a huge portal, if you wish, because it has a huge range. It goes from zero to hundreds.

So ultimately you have many ways to get through that portal. This is one way. This way here, is there's no fundamental error like in like ATSDR has. It's a Tawara Terrace model. And it is actually something that is -- that I would rely on to give you what is a range, a reasonable range, and that's what I did.

Q. How, if at all, did your methodology take into account the cone of depression that develops around a pumping well which causes the losses to increase in the direction of the well?

A. In this calculation here that is basically summarized on this figure, I considered ATSDR water level that they use in their model for both layer one and layer three. And I derived congruent gradient from that.

Now, it is true that the closer to you get to the well, you have what is called a cone of depression, and that cone of depression for potentiometric values would be in layer three because that's where the well is pumping, and it will be less marked in layer one.

So you have several things that you can say that would slightly accelerate or diminish those travel time, if you wish, but you have other things that would actually make them longer. The thing that would accelerate potentially would be as us you get very close to the well, you accelerate. But before you get it close to the well, you have a long way to go. That's the first thing.

The second thing would be you could have dispersion that is not in this calculation. Nobody knows what the dispersion is, but that would accelerate this as well somewhat. On the other end, on the other end, things that would actually elongate the time of travel are two major things. The first one --

Q. Let me withdraw --

A. I am not finished.

Q. I don't know what question you're answering.

A. I am not finished.

Q. I don't know what question you're answering. That's not what I asked you. I withdraw the question. I withdraw the question.

What makes your three path flows representative of what actually occurred with contamination at well TT-26?

A. This is the setup that -- this setup, those layers, the permeability is in each one of those layers. The thickness of those layers is directly from the ATSDR model. I am not trying to critique those. I am just adopting them just to show if you do a calculation in the same framework that the ATSDR model is and you do it without mistakes or errors, you actually can get a representation that is like this.

So it gives you representative travel

time within a large range which is meant to show that you don't have a single model that would tell you the truth because you don't know where the truth is when you don't have data.

Q. What makes the three pathways you chose representative of what occurred at TT-26?

A. Well, similarly to what the ATSDR model represent, you have transport in layer one, and you have transport in layer three. And in order to go to the well, you have to basically end up in layer three because the well is screened in layer three, not in layer one.

Now, between the source, which is the ABC Cleaner, all the way to the well, you have basically many ways for the groundwater to get there. You don't go there through one single pathway. So that's why I choose some pathways, one which would go a short period of time in layer one and some of that contamination would go through the less permeable layer down to layer three and continue in layer three.

I have another pathway that is closer to the well, and I have another pathway that is in between. Those are basically estimates that give you a range of travel time of this situation.

(Hennet Exhibit 27 was marked.)

BY MR. DEAN:

Q. I'm going to show you -- this is my copy. I'm only using page 5-16. It's the same page he's looking at.

MS. O'LEARY: The report, sure.

BY MR. DEAN:

Q. You've got it in front of you. I'll hand you a copy in a moment, but there's actually four pathways represented here on your chart; right?

A. There are three pathways to the well screen, the well screen where the pumped water goes through.

Q. But isn't it true that one of the pathways which you actually show an arrow -- you just stop the arrow -- one of the pathways that you're not considering is the pathway that ATSDR utilized, and that's as I drew on Exhibit 27 where the contaminants go directly in the aquifer all the way to the well; right?

A. Again --

Q. Is that a possible travel way?

MS. O'LEARY: Object to form and foundation.

THE WITNESS: This is a possible pathway. That's an extreme pathway. That will be the fastest of the fastest, and it doesn't go to the screen, as you know. It goes basically to touch the casing of the well which is basically not accepting water.

BY MR. DEAN:

Q. Do you know who Dr. Konikow is?

A. I do know who Dr. Konikow is.

Q. And did you read his report on pages 28 and 29 where Dr. Konikow calculated the alternative travel time to be only 3-1/2 to 5 years, not the 15 to 25 that you did?

A. You have to show me that. And I understand he said something like this. However, I think it was for groundwater transport, not at all related.

Q. Do you take issue that Dr. Konikow opined in his rebuttal report it was 3-1/2 to 5 years he calculated? Can you and I agree that's what he said in his report?

A. You have to show me his report.

Q. I'm going to represent to you that's what it says. Do you disagree or have any basis to disagree with Dr. Konikow's calculations, and if so, what are the bases of your disagreement?

MS. O'LEARY: Object to foundation.

THE WITNESS: What do you represent exactly that Dr. Konikow says?

BY MR. DEAN:

Q. I'm representing to you that Dr. Konikow calculated an alternative travel time and opined in this case of 3-1/2 to 5 years, not the 15 to 25 you calculated.

A. Well, I would disagree with Dr. Konikow's calculation.

Q. Why?

A. Because I made my calculation, and I agree that my calculations are based on site-specific data and they are based the principles of hydrogeology that would allow me to make this calculation that includes the time of travel that it takes for dissolved PCE, which is a compound, a chemical compound in groundwater, and that dissolved PCE is retarded relative to groundwater.

And I took that into consideration, and I focused on the site-specific data. I did not make the same errors that the ATSDR did for the Tawara Terrace model.

Q. So page 5-21 of your report, page 5-21, second sentence, you say in the second sentence "Pumping of well TT-26 was likely not continuous as the well had to be shut down for maintenance and repair."

Do you see that?

A. I see that.

Q. You're aware that ATSDR took into account based on the pumping records when these various wells were on and off; right?

A. ATSDR for well TT-26 took into account two stoppage of the well for maintenance that happened, if I recall, in the 1980s. They did that. But there is no information from before that.

And what ATSDR did in a conservative way, if you wish, was to assume it was always on, never maintained, never stopped, which is wrong because wells that are used for decades, every well needs maintenance or repair.

Q. What evidence do you have, documents, interviews of anybody that you've conducted or review, what factual basis do you have that support a thought, view, your opinion that TT-26 had additional shutdown time not accounted for by

ATSDR?

MS. O'LEARY: Object to form.

THE WITNESS: My answer to this is ATSDR has no information, and, therefore, they assume something that is not realistic in the real world.

BY MR. DEAN:

Q. Do you have any evidence they are wrong?

A. My evidence that they are wrong is that you don't have wells that would be pumped for 30 years without being maintained. That doesn't exist.

Q. You don't have any specific data, any specific documents or specific testimony about specific periods when the wells were shut down; right?

MS. O'LEARY: Objection to form.

THE WITNESS: I believe there is some information. Some capacity test might have been redone. I don't remember specifically for well TT-26. But it is not a correct assumption in my field, in the field of hydrogeology, to assume that because you don't know, it was always on. That is not reasonable.

BY MR. DEAN:

Q. Have you ever evaluated a contamination site for human risk?

A. As a geochemist, I do not do human risk. I just do geochemistry.

Q. For the Hadnot Point spiractor, did you measure the fall height under operating conditions with backwater?

MS. O'LEARY: Object to foundation.

THE WITNESS: With backwater? I do not understand what you mean by that.

BY MR. DEAN:

Q. When you were there, did you measure the fall height under operating conditions on February 11 when there was any water left in the bottom of the spiractor, tubes, pipes?

A. So that means the spiractor was working?

Q. Correct.

A. I did not do that.

Q. Ever done that at all?

A. Could never have done that there.

Q. Are you aware that 43 percent of Camp Lejeune samples tested for FOC had values less than .0001?

MS. O'LEARY: Object to foundation.

THE WITNESS: Show me the data you are talking about because --

BY MR. DEAN:

Q. I'm just asking.

A. .001 of what?

Q. Have you ever been stricken as an expert?

A. I have never been stricken as an expert.

Q. Have you ever had your opinions disregarded by a court in the United States?

A. Among all the testimonies I have done in court, which is 12 or 13, there was one time when one of my answer was actually taken away from the record because I addressed a topic that had already been decided before, and that was basically not -- I should not have talked about that. And the judge decided that that should be stricken, my response should be stricken because it had been decided before. And that's what I understand.

Q. You've never had your opinion -- do you remember the name of that case?

A. I believe that case was Titan, T-I-T-A-N, versus -- I think it's versus the United States.

(Hennet Exhibit 28 was marked.)

BY MR. DEAN:

Q. You don't believe a judge has ever disregarded your testimony because he believed that you had insufficient data to provide the opinions that you had given?

A. I do not recollect any case like this based on data.

Q. I show you Exhibit 28. Turn to page 75. Are you on page 75?

A. Yes.

Q. Page 75, look at page footnote 31. "The court disregards the testimony of the defense expert Remy Hennet geochemical fingerprints of the PCBs found at the DICO site and those found at the SIM site did not match. During cross-examination, Hennet admitted he was mistaken concerning the data on which he based that opinion. Because the opinion was based on unreliable methods utilizing insufficient facts of data, it is inadmissible under Federal Rule of Evidence 702."

Do you see that? Did I read that correctly?

A. You read that correctly.

Q. Now, in the middle of the next paragraph after Federal Rule of Evidence 701, the court went on to say, "In contrast, the court concludes the testimony by defense expert Dr. Remy Hennet that other sources of PCBs were present on the SIM site constituted impermissible expert testimony. The court noted the testimony was based on shear speculation rather than sufficient facts or data and was not the product of reliable principles and methods. Additionally, the court notes the testimony was not supported by personal knowledge or observation as Hennet neither conducted any testing on other items at the SIM site nor observed any labels on other items at the SIM site indicating the presence of PCBs."

Did I read that correct?

A. You read that correct.

Q. Isn't that the same thing you've done in this case?

A. Pardon me?

Q. You speculated, you've not taken into consideration other well pumping information that I've shown you today. Isn't that true?

MS. O'LEARY: Object to foundation.

THE WITNESS: I disagree.

BY MR. DEAN:

Q. That court didn't believe anything --

didn't believe or struck your opinions for the reasons I just read to you; right?

MS. O'LEARY: Object to form.

BY MR. DEAN:

Q. That was 2017, September 2017.

MS. O'LEARY: Object to form.

THE WITNESS: Yes, I remember that case. And I think, you know, for that case there was very little information, and it was basically -- that was the case. That's the way it went. And the judge made his decision.

(Hennet Exhibit 29 was marked.)

BY MR. DEAN:

Q. I'll show you what I marked as Exhibit 29 and 30. Exhibit 29, is this the affidavit you referred to earlier regarding Baby Washington?

MS. O'LEARY: Object to foundation.

BY MR. DEAN:

Q. Is this your report you issued 5 years ago, 4-1/2 years ago, December 22, 2020 expert report Remy Hennet, In Re: Baby Washington case?

A. It looks like it. I haven't looked at it in a while, but it looks like it's my expert report, not an affidavit.

Q. And this was in a Camp Lejeune case pending back in 2020 when you issued this report?

MS. O'LEARY: Object to foundation and form.

THE WITNESS: That was one case, one litigation that basically was -- that is basically some correlation to basically Camp Lejeune.

BY MR. DEAN:

Q. And in the bottom paragraph on page 1, last full paragraph, you say, "The opinions presented in this report were reached by applying accepted methods in the fields of hydrogeology, geochemistry and environmental sciences. Opinions expressed in the report are my own based on my education, my training, my experience and the documents, the information, the photographs, the diagrams, the data and the facts available to me at the time of the writing. I hold these opinions to a reasonable degree of scientific certainty."

Did I read that correctly?

A. You read that correctly.

Q. And on page 3, next to the bottom paragraph, did you write, "The ATSDR conducted a detailed review of the available data and the information and of the history and contamination of the base water systems. (See, for example, Faye and Venezuela 2007; Sautner, et al., 2013)."

Did I read that correctly?

A. You did read that correctly.

Q. You didn't just cite to them. You said they conducted a detailed review; right?

MS. O'LEARY: Object.

THE WITNESS: Yes, I did.

BY MR. DEAN:

Q. Turn to page 10, opinion number three, you opined that Holcomb Boulevard water supply wells weren't contaminated during the time period when Rhonda Bell resided on base; did you not?

A. It speaks for itself.

Q. And in the first paragraph, does it read, "The main monthly contaminant concentrations in the Holcomb Boulevard water supply over the period of the relevant" --

MS. O'LEARY: I'm sorry. We're at time.

MR. DEAN: Let me finish this sentence.

BY MR. DEAN:

Q. Did you state, "The mean monthly contaminant concentrations in the Holcomb Boulevard water supply over the period of relevance to the complaint as shown in Exhibit C,"

and you relied upon those in opining Ms. Bell was not there when there was contamination?
A. That's at Holcomb Boulevard, and I agree with the ATSDR that the Holcomb Boulevard was not contaminated with the exception of a very short period of time as discussed in my expert report.
Q. You utilized, relied upon that work, ATSDR work and those reports when you signed this affidavit, this report in 2020; right?
A. I did rely.
Q. Did you have time --
MS. O'LEARY: I'm sorry. That's your third question now.
THE WITNESS: Can I answer?
BY MR. DEAN:
Q. Yeah, if you answer my question. Yes or no. Did you rely --
A. You cannot jump on me and just confuse me.
Q. Yes or no. Did you rely upon ATSDR mean monthly concentration data in order to opine that Ms. Bell was not on base at a time period when contamination existed at Holcomb Boulevard? Did you opine that?
A. Well, my report speaks for itself.

Q. And you did opine on that issue using ATSDR's work; correct?
A. I considered the ATSDR work. It is not the same --
MS. O'LEARY: I'm sorry. We're finished.
THE WITNESS: It is not the same as what I did for this case.
MS. O'LEARY: We've gone over seven hours, and this deposition is finished.
BY MR. DEAN:
Q. Did you have an opportunity --
MS. O'LEARY: You don't have to answer.
BY MR. DEAN:
Q. Did you have an opportunity to review and do the same work you've done in this case at that time that you wanted to? Can you answer my question?
A. I am advised by counsel that it's out of time. I don't have to answer.
Q. And you're not going to answer my question?
MS. O'LEARY: I'm instructing you not to answer.
THE WITNESS: I did answer your

question. My report stands for itself.

BY MR. DEAN:

Q. No. My question was -- last question I asked you was: Did you have an opportunity to do the same work you did in this case back before you did that report if you wanted to?

MS. O'LEARY: I'm instructing you not to answer.

MR. DEAN: Can we put on the record that Ms. O'Leary has instructed this witness not to answer my last question. What time is it?

MS. O'LEARY: Can we put on the record --

MR. DEAN: What's the time?

THE VIDEOGRAPHER: 7 hours and 3 minutes.

MR. DEAN: 7 hours and 3 minutes. Ms. O'Leary has instructed this witness not to answer my final question.

Thank you for being here, sir. I wish you'd answer my question, but thank you for the time. That's all I have at this time.

THE VIDEOGRAPHER: We are off the record at 1742.

(Whereupon, at 5:42 p.m., the taking of

the instant deposition ceased.)

COMMONWEALTH OF PENNSYLVANIA)
COUNTY OF ALLEGHENY) SS:

C E R T I F I C A T E

I, Ann Medis, RPR, CLR, CSR-WA and Notary Public within and for the Commonwealth of Pennsylvania, do hereby certify:

That REMY J.-C. HENNET, PH.D, the witness whose deposition is hereinbefore set forth, was duly sworn by me and that such deposition is a true record of the testimony given by such witness.

I further certify the inspection, reading and signing of said deposition were not waived by counsel for the respective parties and by the witness.

I further certify that I am not related to any of the parties to this action by blood or marriage and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 19th day of March, 2025.

____

Notary Public

COMMONWEALTH OF PENNSYLVANIA) E R R A T A
COUNTY OF ALLEGHENY) S H E E T

I, REMY J.-C. HENNET, PH.D, have read the foregoing pages of my deposition given on March 20, 2025, and wish to make the following, if any, amendments, additions, deletions or corrections:

Page Line Change and reason for change:

____ ____ ___________________________________

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In all other respects, the transcript is true and correct.

____
REMY J.-C. HENNET, PH.D

_______ day of ________________, 2025.

____
Notary Public

GOLKOW, a Veritext Division
One Liberty Place
1650 Market Street, Suite 5150
Philadelphia, Pennsylvania 19103
877.370.3377

March 26, 2025

Allison O'Learly, Esquire
U.S. Department of Justice
1100 L Street NW
Washington, DC 20005

Re: Deposition of REMY J.-C. HENNET, PH.D
Notice of Non-Waiver of Signature

Dear Ms. O'Leary:

Please have the deponent read his deposition transcript. All corrections are to be noted on the Errata Sheet.

Upon completion of the above, the Deponent must affix his signature on the Errata Sheet, and it is to then be notarized.

Please forward the signed original of the Errata Sheet to Kevin R. Dean, Esquire for attachment to the original transcript, which is in his possession. Send a copy of same to all counsel. Please return the completed Errata Sheet within 30 days of receipt hereof.

Sincerely,

Ann Medis, RPR, CLR, CSR-WA

cc:

Kevin R. Dean, Esquire

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m

u

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted fashion to authenticated parties who are permitted to access the material. Our data is hosted in a Tier 4 SSAE 16 certified facility.

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EXHIBIT 2

Expert Report of Remy J.-C. Hennet

In the United States District Court
Eastern District of North Carolina

No. 7:23-cv-897

In Re: Camp Lejeune Water Litigation

This document relates to:
ALL PLAINTIFFS

S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

December 9, 2024

1801 Rockville Pike, Suite 220, Rockville, Maryland 20852-1649 • (301) 718-8900

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Prepared by:

Remy J.-C. Hennet, PhD

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List of Attachments

List of Acronyms

1,2-DCE	1,2-dichloroethenes
ATSDR	Agency for Toxic Substances and Disease Registry
COC	contaminant of concern
foc	fraction organic carbon
gpm	gallons per minute
g/L	grams per liter
HB	Holcomb Boulevard
HB-WTP	Holcomb Boulevard Water Treatment Plant
HP	Hadnot Point
HP-WTP	Hadnot Point Water Treatment Plant
Koc	partition coefficient
L/Kg	liters per kilogram
ug/L	micrograms per liter
MCL	maximum contaminant level
MGD	million gallons per day
NA	not analyzed
ND	not detected
PCE	Perchloroethene, tetrachloroethene, tetrachloroethylene
SSP&A	S.S. Papadopulos & Associates, Inc.
TCE	Trichloroethene, trichloroethylene
TT	Tarawa Terrace
TTHMs	total trihalomethanes
TT-WTP	Tarawa Terrace Water Treatment Plant
USEPA	U.S. Environmental Protection Agency
VC	vinyl chloride
VOC	volatile organic compound
WTP	water treatment plant

REPORT

Section 1
Task

I, Remy J-C. Hennet of S.S. Papadopulos & Associates, Inc. ("SSP&A") was retained by the U.S. Department of Justice to evaluate the Plaintiffs' allegations in the Master Complaint, to evaluate and respond to the Plaintiffs' expert reports regarding groundwater contamination at Marine Corps Base Camp Lejeune ("Camp Lejeune" or "the Base"), and to review the Agency for Toxic Substances and Disease Registry's ("ATSDR") water modeling reports on historic contaminant concentration estimates in the Base water supply in order to render opinions and write an expert report. I undertook these tasks through a review of the available data and information.[1]

The Master Complaint alleges that from August 1, 1953, until December 31, 1987, Camp Lejeune residents were harmed from exposure to contaminated drinking water supplied through various means by the Hadnot Point ("HP-WTP"), Tarawa Terrace ("TT-WTP"), and Holcomb Boulevard ("HB-WTP") water treatment plants and drinking water distribution systems. The contaminants of concern ("COCs") are benzene and the chlorinated hydrocarbons perchloroethene ("PCE"), trichloroethene ("TCE"), 1,2-dichloroethene ("1,2-DCE"), and vinyl chloride ("VC"), which were discovered in the 1980s in the water supply of Hadnot Point ("HP"), Holcomb Boulevard ("HB"), and Tarawa Terrace ("TT").

[1] U.S. District Court for the Eastern District of North Carolina, Southern Division, Plaintiffs' Master Complaint, *In Re: Camp Lejeune Water Litigation*, No. 7:23-CV-897, 10/6/2023.

Section 2
Qualifications

I am a Senior Principal at SSP&A. I hold a Ph.D. degree in geochemistry and a Master's degree in geology from Princeton University, and university degrees in hydrogeology and geology from the University of Neuchatel, Switzerland. My expertise includes the application of geochemistry, hydrogeology and geology to evaluate the origins, fate, and transport of contaminants in the environment. I have more than 30 years of relevant professional experience evaluating the timing of chemical releases, developing geochemical models, and conducting environmental forensics in the context of regulations and guidance or directives from regulatory agencies.

My Curriculum Vitae and list of testimony in the last four years are provided as Attachment A. The list of documents I have considered and/or relied upon will be provided separately as Attachment B.

The hourly rate charged by SSP&A for my services is $363.

Section 3
Overview of Opinions

The opinions presented in this report were reached by applying accepted methods in the fields of hydrogeology, geochemistry and geology. I hold these opinions to a reasonable degree of scientific certainty. I reserve the right to supplement and/or amend my opinions in this matter as necessary if additional documents or information are made available for my review.

Opinion 1. The Base Water Supply Systems Other Than Tarawa Terrace, Hadnot Point, and Holcomb Boulevard Were Not Contaminated.

- The water distribution plants at the Base other than Tarawa Terrace, Hadnot Point, and Holcomb Boulevard that were active during the period of the Act were: Courthouse Bay; Rifle Range; Onslow Beach; Montford Point/Camp Johnson; Marine Corps Air Station New River; and Camp Geiger. Following my evaluation of the available data and information, I agree with ATSDR that the only Base water supply systems contaminated with the COCs were Tarawa Terrace, Hadnot Point, and Holcomb Boulevard.

Opinion 2. A Substantial Portion of COCs in the Raw Water Was Unavoidably Lost During Subsequent Storage, Treatment, and Distribution.

- The chemical and physical properties of the COCs make it unavoidable that substantial portions of the COCs were lost to the air and removed with filter backflush water and the disposal of spent solids used for water treatment.

Opinions for Tarawa Terrace

Opinion 3. The TT-WTP System Likely Became Contaminated in the 1970s When the COCs Reached Supply Well TT-26 and Ended on February 8, 1985 When TT-26 Was Shut Down.

- The water supply at Tarawa Terrace was likely contaminated with PCE and possibly smaller amounts of TCE and 1,2-DCE over the period that likely started in the 1970s and ended in February 1985 when contaminated-supply-well TT-26 was removed from service. The data demonstrates that thereafter, the water supplied by TT-WTP was not contaminated with chlorinated COCs with the exception of low levels when TT-23 was used for 24 hours, and trace levels in April 1985. As explained further in Opinion 4, TT-WTP occasionally showed trace levels of benzene below the method detection limit. The end of the period of the Act corresponds approximately to the closure of TT-WTP (and Camp Johnson/Montford Point WTP) and the beginning of water supplied to these areas coming from HB-WTP rather than the closure of contaminated supply well TT-26.

Opinion 4. The TT-WTP System Was Likely Not Contaminated with Benzene.

- The TT-WTP water supply was likely not contaminated with benzene, as this COC was not detected or only reported at trace levels below the method detection limit. The analyses of 47 water samples between February 5, 1985, and December 16, 1986, reported no benzene detection above the method detection limit and only trace levels (flagged "J") to indicate an estimated value below the method detection limit in a portion of the samples.

Opinions for Hadnot Point

Opinion 5. The HP-WTP System Likely Became Contaminated Sometime After Supply Well HP-651 Began Pumping in July 1972.

- The treated water supplied by the HP-WTP was likely not contaminated or contaminated at trace levels only prior to July 1972 when contaminated well HP-651 was first used.[2] The treated water was not contaminated with TCE after February 1985, as demonstrated by the data. The only available data indicating when HP-651 was or was not pumping is from November 1984 to February 1985. The pumping information suggests an average TCE concentration in the order of 200 micrograms per liter (ug/L) on average (calculated at 227 ug/L) for finished water at the HP-WTP.

Opinion 6. The HP-WTP System Was Likely Not Contaminated with Benzene.

- The HP-WTP water supply was likely not contaminated with benzene over the period of the Act. The reported detection of benzene in November-December, 1985, if real, was a short duration incident and does not represent benzene concentration in the water supply over the period of the Act.

Opinions for Holcomb Boulevard

Opinion 7. Supplemental Water from HP-WTP Represented a Small Fraction of the Water in the HB-WTP Distribution Area.

- During spring and summer months, supplemental water from the HP-WTP represented a small fraction of the HB-WTP water supply from 1972 to the end of the period of the Act.

Opinion 8. Between January 27 and February 5, 1985, When HB-WTP Was Shut Down, All Water Distributed in the HB-WTP Distribution Area was Supplied by HP-WTP.

- The Holcomb Boulevard water supply was contaminated with water supplied by HP-WTP during the period January 27 to February 5, 1985. Residual concentrations remained for a few days at certain locations until complete flushing of the system was completed.

Opinions for ATSDR Models and Reports

Opinion 9. The ATSDR Model Results Are Biased High as a Result of Conservative Assumptions.

- ATSDR's assumptions are deficient, not verifiable, and at times demonstratively incorrect. ATSDR's COC concentration estimates are not quantitatively reliable as different plausible

[2] It is unlikely that HP-651 was contaminated in the early period of its use as the source of contamination was located downgradient from the well.

assumptions would lead to different results. ATSDR's COC concentration estimates are for raw water, which is not equivalent to COC concentrations in the distributed water.

Opinion 10. The ATSDR Models Did Not Account for the Unavoidable COC Losses During Water Treatment and Distribution.

- The ATSDR models are estimates for raw water prior to treatment and distribution. Treatment and distribution COC losses are unavoidable and unaccounted for by ATSDR.

Opinion 11. ATSDR Failed to Consider the Available Site Data to Parametrize Their Water Models.

- Rather than using the site-specific data to derive relevant Kd values for the COCs in groundwater, ATSDR arbitrarily selected a Kd value for the Tarawa Terrace model, and a generic fraction organic carbon (foc) value for the Hadnot Point model. The Kd value for the Tarawa Terrace model is below the reasonable range, and the Kd value for the Hadnot Point model is at the low end of the reasonable range. ATSDR's use of low Kd values had the effect of accelerating arrival of contaminants at the supply wells.

Opinion 12. There Are Unsupported Inconsistencies Between the ATSDR Models.

- The incorrect starting date for ABC Cleaners and out-of-range parameters that are inconsistent with site-specific data, or out of reasonable range for the aquifer materials, render the results from the ATSDR Tarawa Terrace model unreliable. Furthermore, the inconsistencies in input parameters (Kd, bulk density, biodegradation rates) used in the two ATSDR groundwater models raise serious doubts on the reliability of the modeling performed. This all adds to the high level of uncertainty that cannot be avoided for modeling long periods of time without any data, as performed by ATSDR.

Opinion for Water Buffaloes

Opinion 13. COC Concentrations in the Mobile Field Water Tanks (Water Buffaloes) Were Likely Substantially Lower than in the Water Treatment Plants' Treated Water.

- A substantial portion of COCs that may have been present in water used to fill a water buffalo would have unavoidably been lost to evaporation during filling, use, and variations of temperature. These losses would have been in the order of 41% to 61% based on my estimation.

I reserve the right to amend these opinions should new information be provided or become available to me.

Section 4
Introduction

4.1 Overview of Geology, Hydrogeology, and Geochemistry

Geology and hydrogeology are fields of science that study the composition of naturally occurring soil and rock materials, their origin, transformation, and interaction between water and the solid matrix of the subsurface. This includes the study of groundwater flow in aquifers.[3]

Precipitation water infiltrates through soils and together with air occupies the voids in the unsaturated zone (aka vadose zone). Beneath the unsaturated zone comes the saturated zone which holds groundwater, meaning the zone where all voids are occupied by water. The water table separates the unsaturated and saturated zones. Groundwater is a resource when it can be pumped from the ground in sufficient quantity for a water supply. Within the saturated zone, several aquifers can be encountered. Aquifers are separated by low permeability layers that limit but typically do not fully prevent water exchanges between aquifers. An unconfined aquifer is the first aquifer encountered and is topped by the water table. A confined aquifer is an aquifer separated from an unconfined aquifer by a layer of low permeability materials, such as a clay layer. Aquifers with fresh groundwater are desired resources for water supplies. Exhibit I-1 illustrates conceptually the geology and hydrogeology of the subsurface.

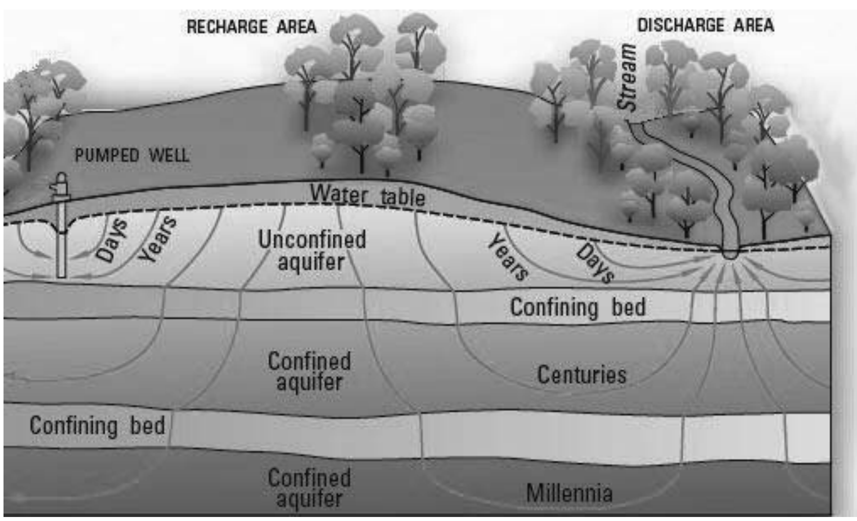

Exhibit I-1. Conceptual Representation of the Subsurface with Aquifers and Flow Paths with Times of Travel for Groundwater along the Flow Paths
(https://www.usgs.gov/media/images/conceptual-groundwater-flow-diagram)

[3] There are numerous treatises that describe the principles of geology and hydrogeology, including: Earle, S. *Physical Geology* (2nd ed. 2019); Woessner & Poeter, *Hydrogeologic Properties of Earth Materials and Principles of Groundwater Flow* (2020); Hudak, P.F. *Principles of Hydrogeology 2* (3rd ed. 2005); Freeze & Cherry, *Groundwater* 47–49 (1979).

The ability of groundwater to move depends on the aquifer permeability and the pressure gradient (hydraulic gradient). Permeability is a property of the aquifer itself and represents the resistance for groundwater to flow through the aquifer matrix. High permeability aquifers are favorable for groundwater flow whereas low permeability layers have a high resistance to groundwater flow. The hydraulic gradient is what drives the flow of groundwater. The higher the hydraulic gradient the more energy is available for groundwater to flow. Groundwater flows from high potential energy areas toward discharge areas of lower potential energy. Potential energy can be measured and is typically reported as feet of water pressure. Discharge areas for groundwater can be a surface water body (coastline, stream, lake, pond, spring, etc.) or a pumping well, for example. The groundwater that is withdrawn through discharging or pumping is replaced with precipitation water that infiltrates to groundwater as a part of the global water cycle.

Geochemistry is the field of science that studies the interactions of natural and man-made chemicals in the environment. Geochemistry includes the study of the origin, fate, and transport of chemicals in the environment. Information about the origin of a chemical can be determined from site-specific information and chemical data. The fate of a chemical is what happens once it enters the environment. A chemical can be dissolved in water, volatilized to air, or sorbed (attached) to solids such as soil and rock materials. A chemical can also be partially or fully degraded into other chemical compounds. Organic chemicals, that include the COCs, can be partially or fully biodegraded in the environment at rates that are a function of the properties of a chemical and the geochemical and microbiological conditions encountered in the subsurface.

The transport of a chemical is its movement in the environment. For example, a chemical dissolved in groundwater can be transported with groundwater toward a discharge area or a pumping well. Organic chemicals, that include the COCs, move dissolved in groundwater but at a rate that can be substantially slower than the rate of groundwater flow. The term retardation is used to refer to the transport of a chemical at a slower rate than the groundwater in which the chemical is dissolved. For the COCs in the groundwater beneath the Base, the rate of transport is retarded relative to groundwater flow. The degree of retardation for the COCs depends on COC-specific properties and the nature or composition of the aquifer matrix through which transport takes place. The properties of a chemical are available from the literature.[4] The nature or composition of the aquifer matrix is site-specific and requires characterization (i.e., measurements on core samples for foc; geological description).

Retardation (R) for a given COC is calculated using its specific sorption partition coefficient (Koc), the foc in the aquifer matrix, the aquifer matrix bulk density (Db), and the porosity (n) of the aquifer:

$$Kd = Koc * foc$$

$$R = 1 + Kd*Db/n$$

where for a given chemical Kd is termed the distribution coefficient.

[4] MacKay et al., 2006; U.S. Dept. Commerce Nat'l Inst. Standards & Tech., *Chemistry WebBook*, *available at*: https://webbook.nist.gov/chemistry/form-ser/.

For the COCs addressed in this report, the retardation factor is typically in the range 2-5 meaning that the dissolved COCs travel more slowly than groundwater by a factor of 2 to 5.

4.2 Groundwater and Water Supply at Camp Lejeune

Marine Corp Base Camp Lejeune is located along the estuary of the New River on the coast of the Atlantic Ocean in Onslow County, North Carolina. The Base complex was developed starting in 1941 and presently covers an area of over 244 square miles. The Base is home to active duty, dependents, retirees and civilian personnel in barracks and housing units that were constructed at several locations throughout the Base including: Camp Johnson, Camp Geiger, Courthouse Bay, Rifle Range, French Creek, Hadnot Point, Midway Park, Paradise Point, Hospital Point, Tarawa Terrace, Knox trailer park, Marine Corp Air Station (also referred to as Marine Corp Air Station New River), Berkeley Manor, and Watkins Village.[5] The history of the Base water supply is addressed in Dr. Brigham's expert report.

A shallow aquifer and a deeper aquifer are used to supply the Base drinking water. Deeper in the subsurface, groundwater quality is poor.[6] For this reason, more than 100 supply wells have been constructed over time to satisfy the demand of the Base water supplies.[7] The need for numerous wells is to prevent the intrusion of poor-quality groundwater into the potable freshwater resource in the shallow aquifer and the top of the Castle Hayne aquifer. Groundwater is pumped from the shallow aquifer and from the top of the Castle Hayne aquifer which is a locally confined aquifer. The geological materials in both aquifers consist of sediments deposited in or near the ocean. The sediments are composed of sands, clays, marls, and layers of consolidated rocks such as limestone and sandstone as described and summarized by LeGrand in three reports for the development of the Base water supply.[8] LeGrand was the consulting geologist hired to evaluate and describe the groundwater resource at the Base for development. The subsurface geology of the Base is illustrated with cross sections in Exhibit I-2a) and b). The pumping wells were historically turned on or off to satisfy demand and to prevent intrusion of salt water or water of poor quality in the supply wells, as recommended by LeGrand.[9] The supply wells required maintenance and were periodically turned off for testing and repairs.[10] Defective wells were removed from service and additional wells were constructed over time to satisfy the needs of the Base water supply.[11] Exhibit

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5 See Brigham Expert Report.

6 LeGrand, Harry E., 10/23/1958, page 2 [CLJA_CLW0000000004]

7 USGS (Harned, Douglas A., et al.), 1989, page 19 [CLJA_WATERMODELING_01-0000084716]

8 I.e., LeGrand, Harry E., 10/23/1958, pages 2-3 [CLJA_CLW0000000004 - 0005]; LeGrand, Harry E., 4/2/1959, page 2-3 [CLJA_CLW0000000035 - 0036]; LeGrand, Harry E., May 1959, pages 3-4 [CLJA_CLW0000000050 - 0051]

9 LeGrand, Harry E., May 1959, pages 9-10 [CLJA_CLW0000000056 - 57]

10 Historical Camp Lejeune Water Distribution System Capacity Reports [CLJA_USMCGEN_0000125994-126092]; ATSDR (Maslia, Morris L., et al.), July 2007, page A18 - A19 [CLJA_WATERMODELING_09-0000615667 - 70]; ATSDR (Maslia, Morris L., et al.), March 2013, page A11 - A12 [CLJA_WATERMODELING_01-0000942613 - 14]; [CLJA_CLW0000001121 - 1122] and [CLJA_CLW0000006950 - 6953]

11 ATSDR (Maslia, Morris L., et al.), July 2007, page A18 - A19 [CLJA_WATERMODELING_09-0000615667 - 70]; ATSDR (Maslia, Morris L., et al.), March 2013, page A11 - A12 [CLJA_WATERMODELING_01-0000942613 - 14]

I-3 summarizes the number of wells in the design of the major WTPs at the Base during the statutory period.

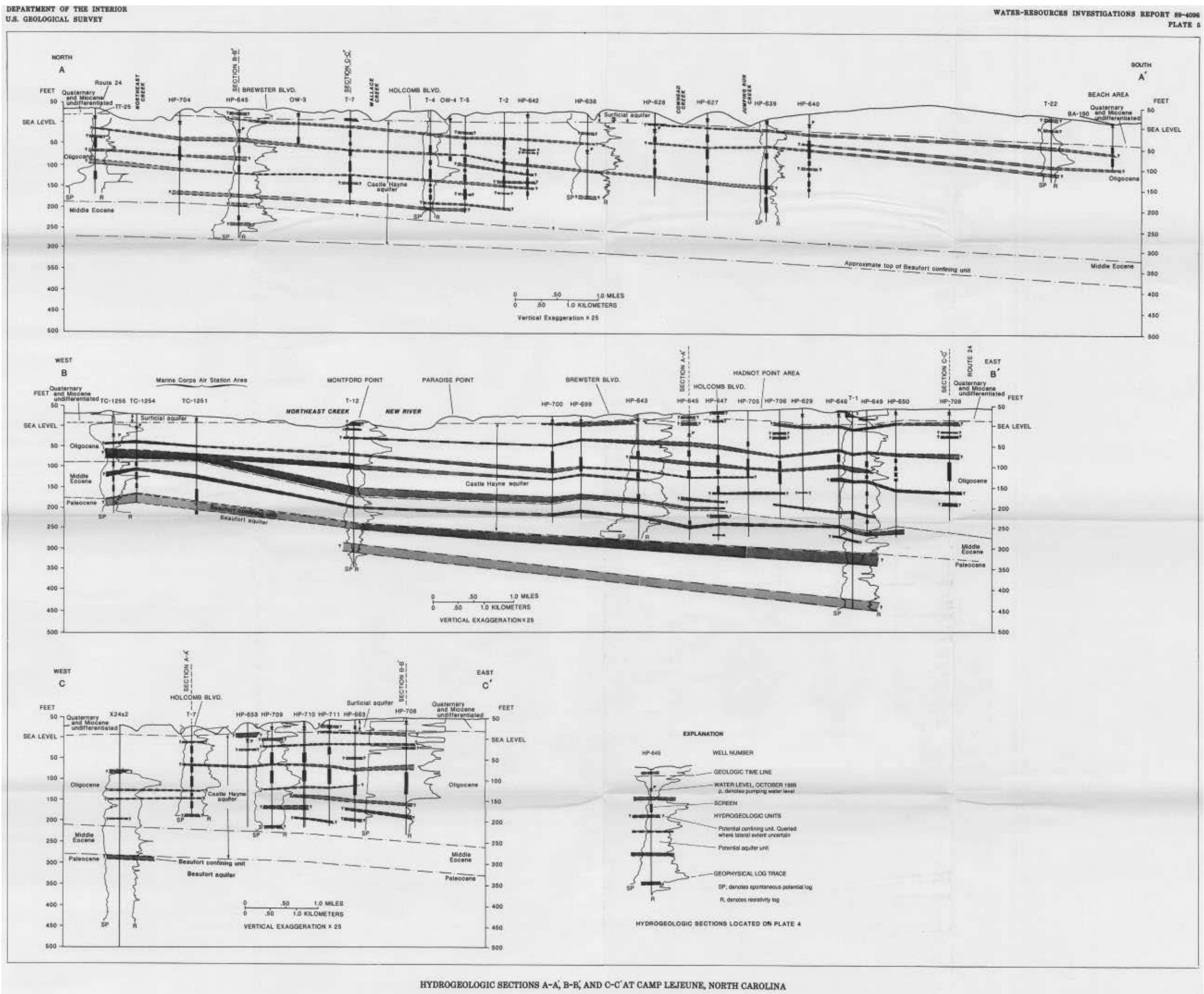

Exhibit I-2a. Base Area Geological Cross Sections[12]

[12] USGS (Harned, Douglas A., et al.), 1989, plate 5 [CLJA_WATERMODELING_01-0000084767].

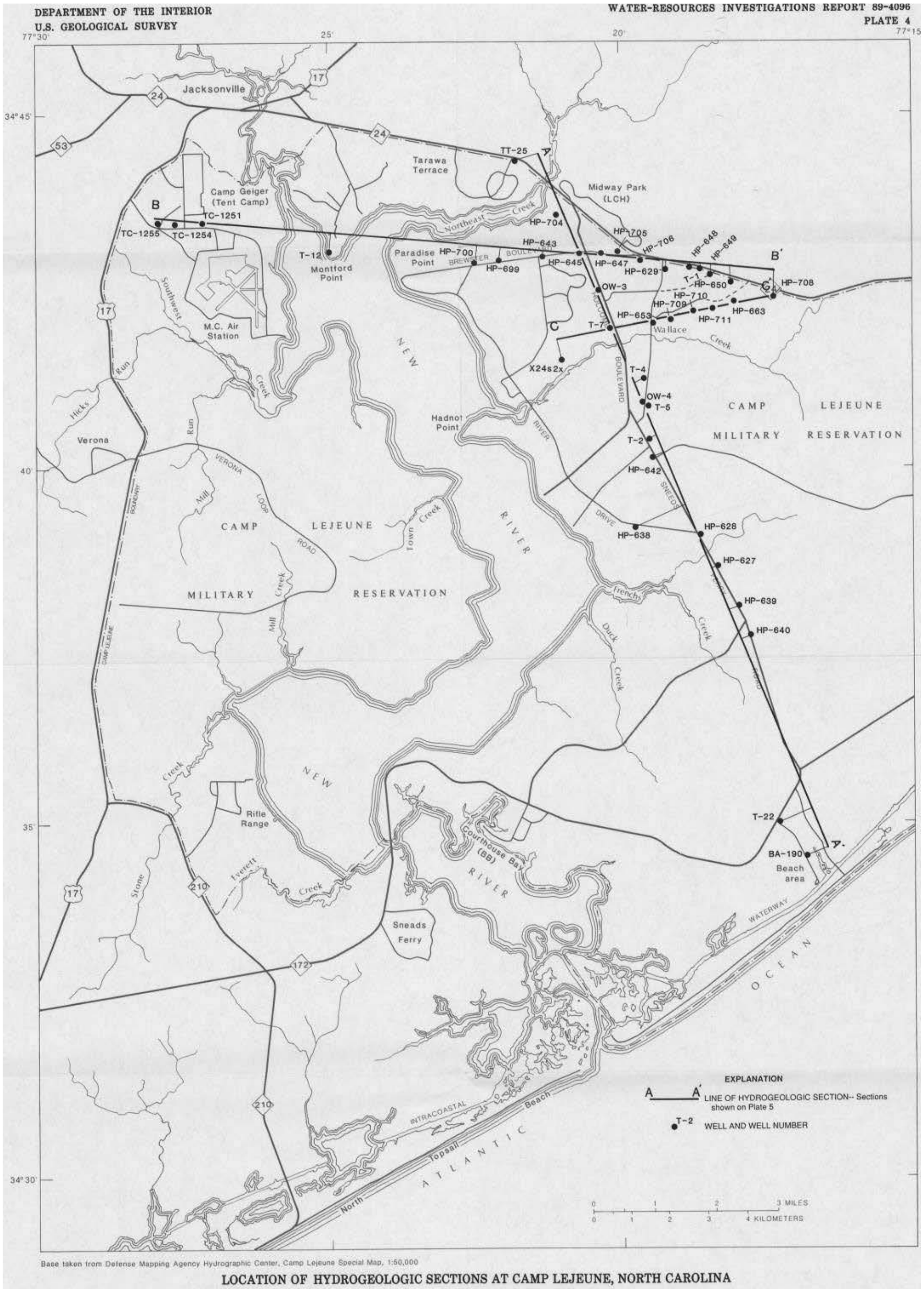

Exhibit I-2b. Base Area Geological Cross Sections[13]

[13] USGS (Harned, Douglas A., et al.), 1989, plate 4 [CLJA_WATERMODELING_01-0000084766].

Exhibit I-3. Base Water Supply Systems

System	WTP Location	WTP Design Capacity (MGD)	Design Supply Wells	Treated Water Storage (MM Gallons)	Number of Water Towers	Citations
Hadnot Point	HP-20	5	40	2.5	4	CLJA_WATERMODELING_07-0000003169
Holcomb Boulevard (pre-1987)	HB-670	2	8	1	3	CLJA_WATERMODELING_07-0000003181
Holcomb Boulevard (1987-Present)*	HB-670	5	18	3	5	CLJA_WATERMODELING_07-0000003175
Tarawa Terrace*	TT-38	1	7	0.75	1	CLJA_WATERMODELING_07-0000003183
MCAS New River†	MCAS-110	3.5	26	0.725	2	CLJA_WATERMODELING_07-0000003137 - 39
Onslow Beach	BA-138	0.25	2	0.25	1	CLJA_WATERMODELING_07-0000003159
Rifle Range	RR-85	0.6	4	0.35	1	CLJA_WATERMODELING_07-0000003161
Courthouse Bay	BB-190	0.6	5	0.35	1	CLJA_WATERMODELING_07-0000003165
Montford Point/Camp Johnson*	M-178	0.75	7	0.4	1	CLJA_WATERMODELING_07-0000003193

a. *Holcomb Boulevard WTP was upgraded in 1987, replacing the Tarawa Terrace and Montford Point/Camp Johnson WTPs which were subsequently shutdown in 1988 [CLJA_CLW0000001821-1822]

b. †Camp Geiger pumping station served by MCAS New River and had its own 0.872 MM gallons treated water storage along with 2 water towers [CLJA_WATERMODELING_07-000003141]

The groundwater pumped by the supply wells was blended in the raw water reservoir and then pumped to a WTP. As part of treatment in the WTP the water was disinfected, treated to remove excess dissolved metals, and filtered to remove suspended solids. The treated water was then pumped to one or more treated water reservoirs. From the treated water reservoirs, the water was pumped to water towers for distribution. Schematics of the HP-WTP, TT-WTP, and HB-WTP water system are illustrated in Exhibit I-4a), b), and c).

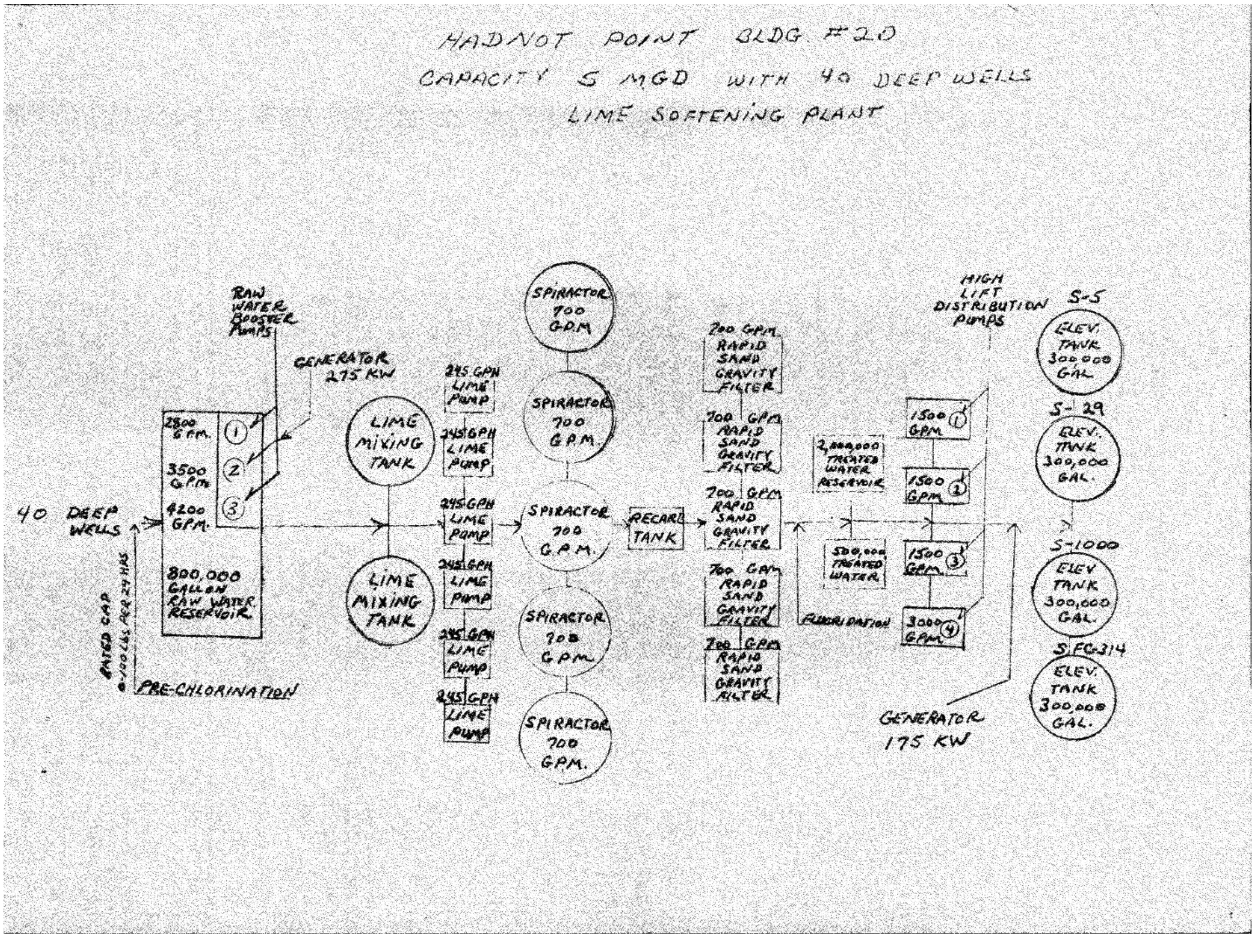

Exhibit I-4a. Schematic of HP-WTP [CLJA_WATERMODELING_07-0000003171]

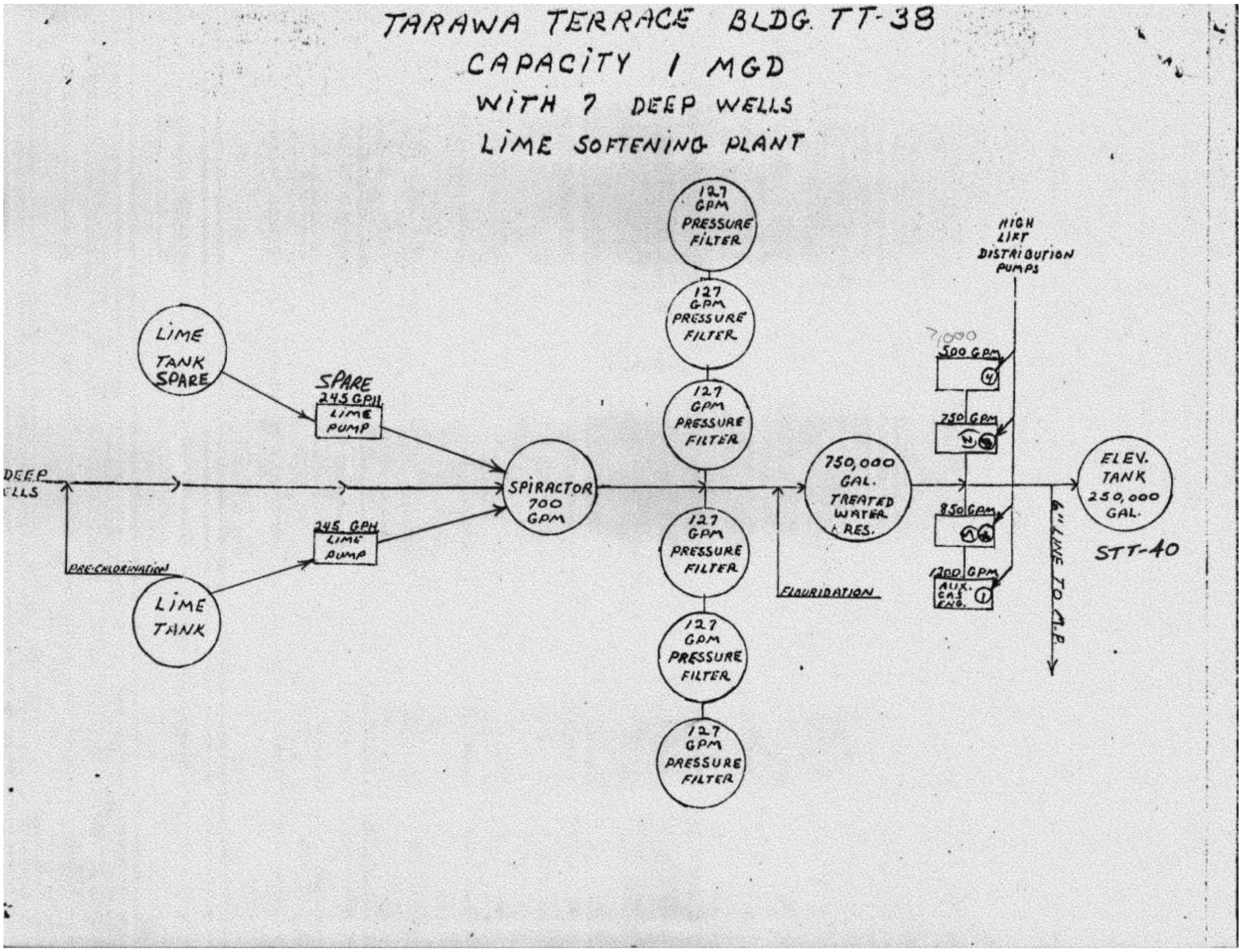

Exhibit I-4b. Schematic of TT-WTP [CLJA_WATERMODELING_07-0000003183]

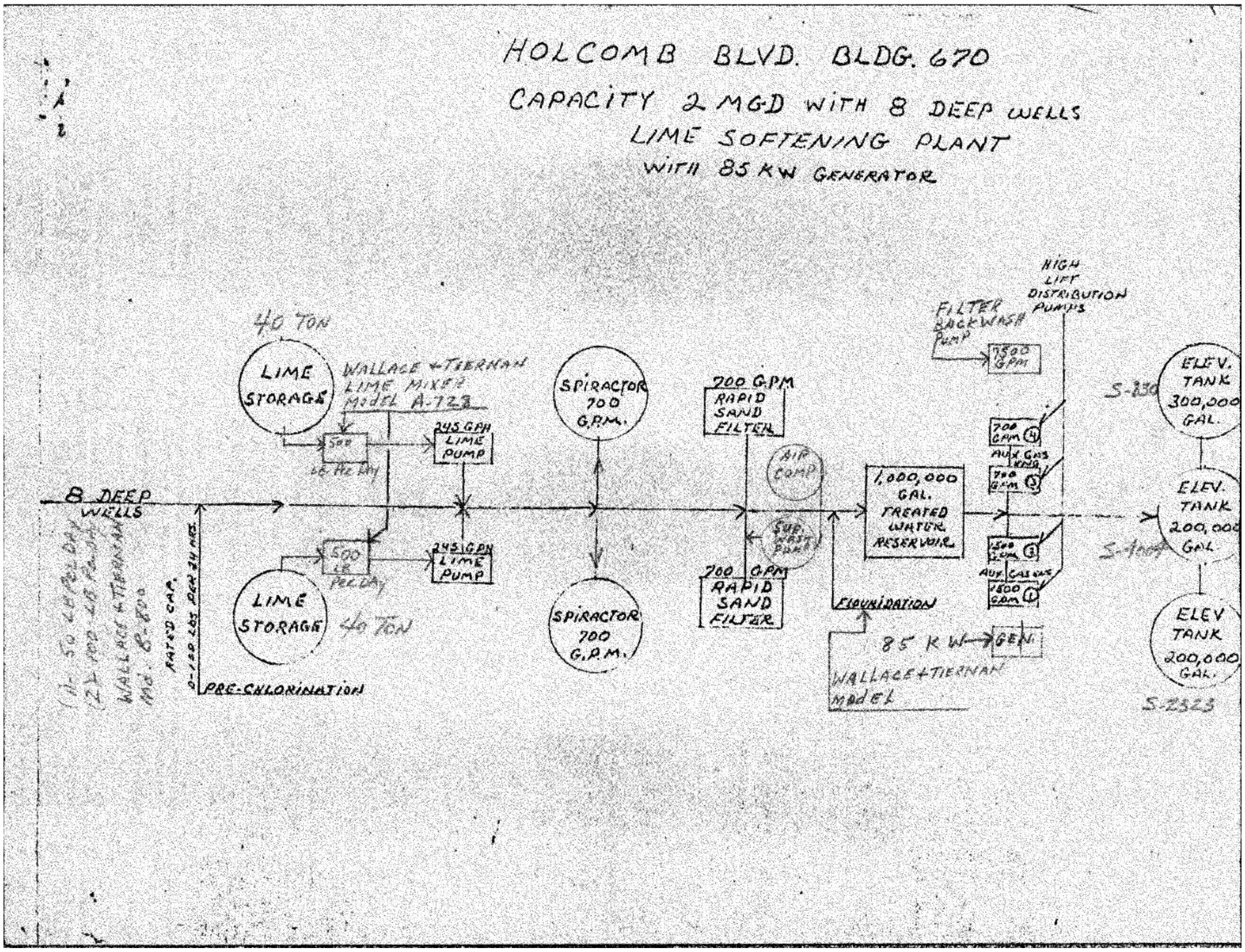

Exhibit I-4c. Schematic of HB-WTP [CLJA_WATERMODELING_07-0000003181][14]

Water softening treatment consisted of the addition of hydrated lime to the raw water to induce precipitation of minerals (i.e., carbonates and oxyhydroxides) to remove iron, manganese, and other metals. Water softening took place in large vertical flow-through vessels called spiractors. The spiractors were loaded with a catalyst sand that promoted the formation of the mineral precipitates. The catalyst sand increased in volume over time as more and more mineral precipitates accumulated in the spiractors.[15]

A map with the location of Base supply wells is shown as Exhibit I-5.

[14] HB-WTP was upgraded to a 5 MGD capacity in 1987; cf. CLJA_WATERMODELING_07-0000003175 and Marine Corps Base Master Plan, 01/01/1985, page IV-137 [CLJA_WATERMODELING_01-0000317326]

[15] The Permutit Company, October 1971, pages 1-7 [CLJA_WATERMODELING_07-0001125658 - 1125671]

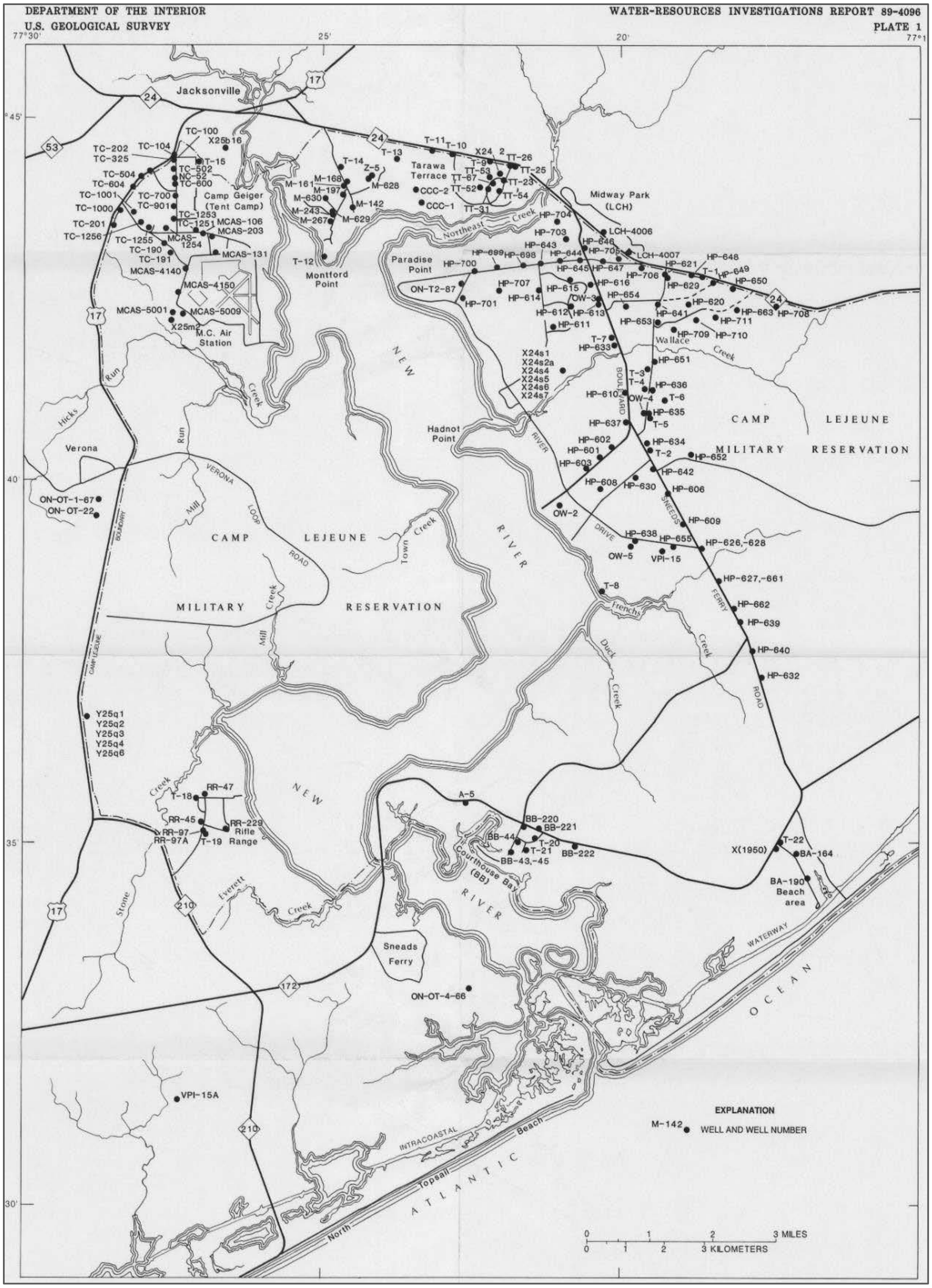

Exhibit 1-5. Location Map for Supply Wells[16]

[16] USGS (Harned, Douglas A., et al.), 1989, plate 1 [CLJA_WATERMODELING_01-0000084763]

4.3 Contaminants of Concern

The COCs that were discovered in groundwater in a subset of the wells in the Tarawa Terrace and Hadnot Point water distribution systems are neutral volatile organic chemical compounds (VOCs). A neutral compound is a molecule that possesses no charge (i.e., not positively or negatively charged). Neutrally charged compounds have low aqueous solubility and high volatility, meaning they readily evaporate to the air. An everyday example of the easy evaporation to the air of VOCs is acetone, the solvent in nail polish remover. Another example is white-out fluid which used to contain PCE and/or TCE.[17] Upon exposure to the atmosphere, these products readily lose their volatile organic compound content to the air as can easily be smelled by the user.[18] Yet another example is chlorination of drinking water from which chlorine gas can be smelled at the tap when sufficient chlorine is added to drinking water for disinfection.[19]

The COCs at the Base originated from the use of man-made solvents (the chlorinated volatile hydrocarbons PCE and TCE) and fuels (benzene). When contaminated water or soil is exposed to the air, these chemicals preferentially volatilize to the air. In the ground, these chemicals tend to attach to soil and aquifer materials in a process called sorption. Sorption of the COCs is particularly strong for the organic matter that is naturally present in the aquifer materials. As previously discussed, in groundwater sorption has the effect to slow or retard the transport of dissolved COCs relative to the rate of groundwater flow.

COCs can biodegrade into other chemicals in the groundwater environment. The rates of biodegradation depend on site-specific conditions. For example, the half-life of the COCs can vary between little or no biodegradation under some conditions to complete biodegradation to other chemical compounds under more favorable conditions.[20] In groundwater, the chlorinated COCs can be slowly transformed and biodegraded under anaerobic conditions (i.e., absence of dissolved oxygen in water) in the presence of microorganisms. For example, PCE biodegrades to TCE, which in turn biodegrades to 1,2-DCE, and further to VC, and ultimately to non-chlorinated compounds. This is illustrated in Exhibit I-6. Benzene is readily degradable in the environment under aerobic conditions (i.e., presence of dissolved oxygen in water) but biodegrades slowly under anaerobic conditions.[21] Site-specific data on microorganisms' activities and chemical parameters that are not available for the source areas and groundwater environment would be required to derive reliable

[17] U.S. EPA, March 2001, EPA/600/R-00/099, pages 2 and 32.

[18] Paediatrics & Child Health, April 1998, page 132.

[19] World Health Organization, Guidelines for drinking-water Quality, Fourth edition incorporating the first and second addenda, Chapter 10.2, p. 241, available at https://iris.who.int/bitstream/handle/10665/352532/9789240045064-eng.pdf?sequence=1&isAllowed=y#page=265; CDC Webpage, "About Water Disinfection with Chlorine and Chloramine", https://www.cdc.gov/drinking-water/about/about-water-disinfection-with-chlorine-and-chloramine.html; Washington State Department of Health, Fact Sheet: Color, tase, and odor problems in drinking water, 331-286, Revised February 2018, available at: https://doh.wa.gov/sites/default/files/legacy/Documents/Pubs/331-286.pdf.

[20] Pankow and Cherry, 1996, Chapter 9.

[21] Vogt et al., Microbial Biotechnology, 2011, 4(6), pp. 710-724.

biodegradation rates for the COCs under site conditions. Absent such site-specific data, assigning biodegradation rates to the COCs in groundwater becomes uncertain and at best a subjective guess.

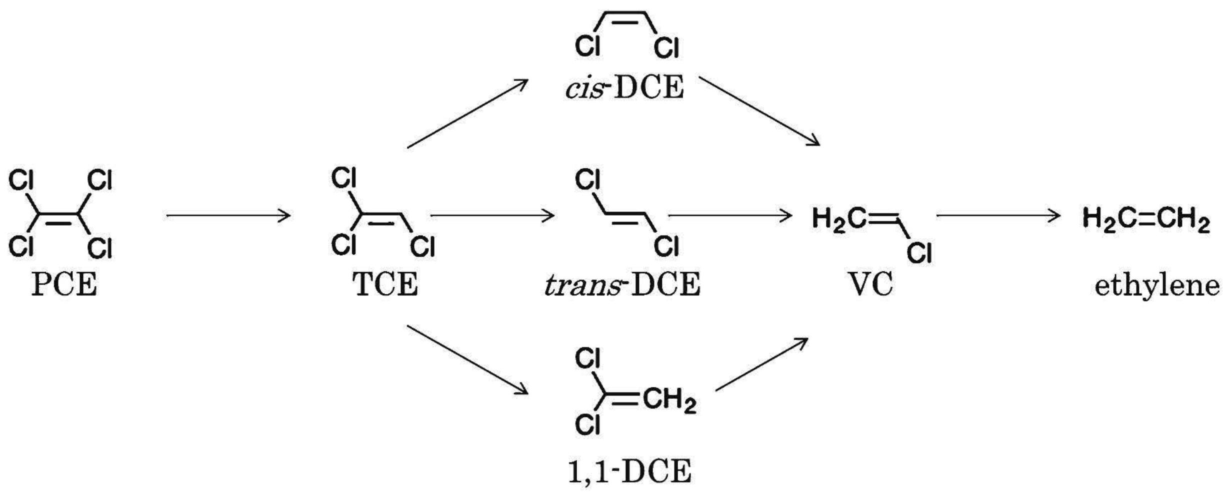

Exhibit I-6. Biodegradation of the Chlorinated COCs[22]

For parameters other than site-specific biodegradation rates, there is reliable data from the literature on the specific properties of each COC. The available data includes aqueous solubility, air-water partition coefficient, and water-organic carbon partition coefficient. This type of information is typically used to estimate losses, attenuation through biodegradation and dispersion, and rate of transport for the COCs in the groundwater environment. The term retardation applied to dissolved COCs is the relative rate of transport for the dissolved COC compared to groundwater. The difference in transport rates between the individual COCs is due to COC-specific properties.[23]

4.4 Contaminant Sources

The extent of COC contamination in the areas of the water supply wells has been investigated.[24] Soil and groundwater remediation has been implemented, is on-going, or is planned.[25] A map of the Base area with Tarawa Terrace, Hadnot Point and Holcomb Boulevard is shown as Exhibit I-7.

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[22] Yoshikawa et al., 2017. Microbes Environ. Vol. 32, No. 3, 188-200.

[23] MacKay et al., 2006; Pankow and Cherry, 1996.

[24] Environmental Science and Engineering, April 1992, pages 2-1 to 2-3 [CLJA_WATERMODELING_01-0000480581 - 480585]

[25] e.g., Baker Environmental, 08/24/1999, [CLJA_WATERMODELING_01-0000114385 - 114534]; NCDENR, August 2003, [CLJA_WATERMODELING_01-0000136711 - 136793]; https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0403185.

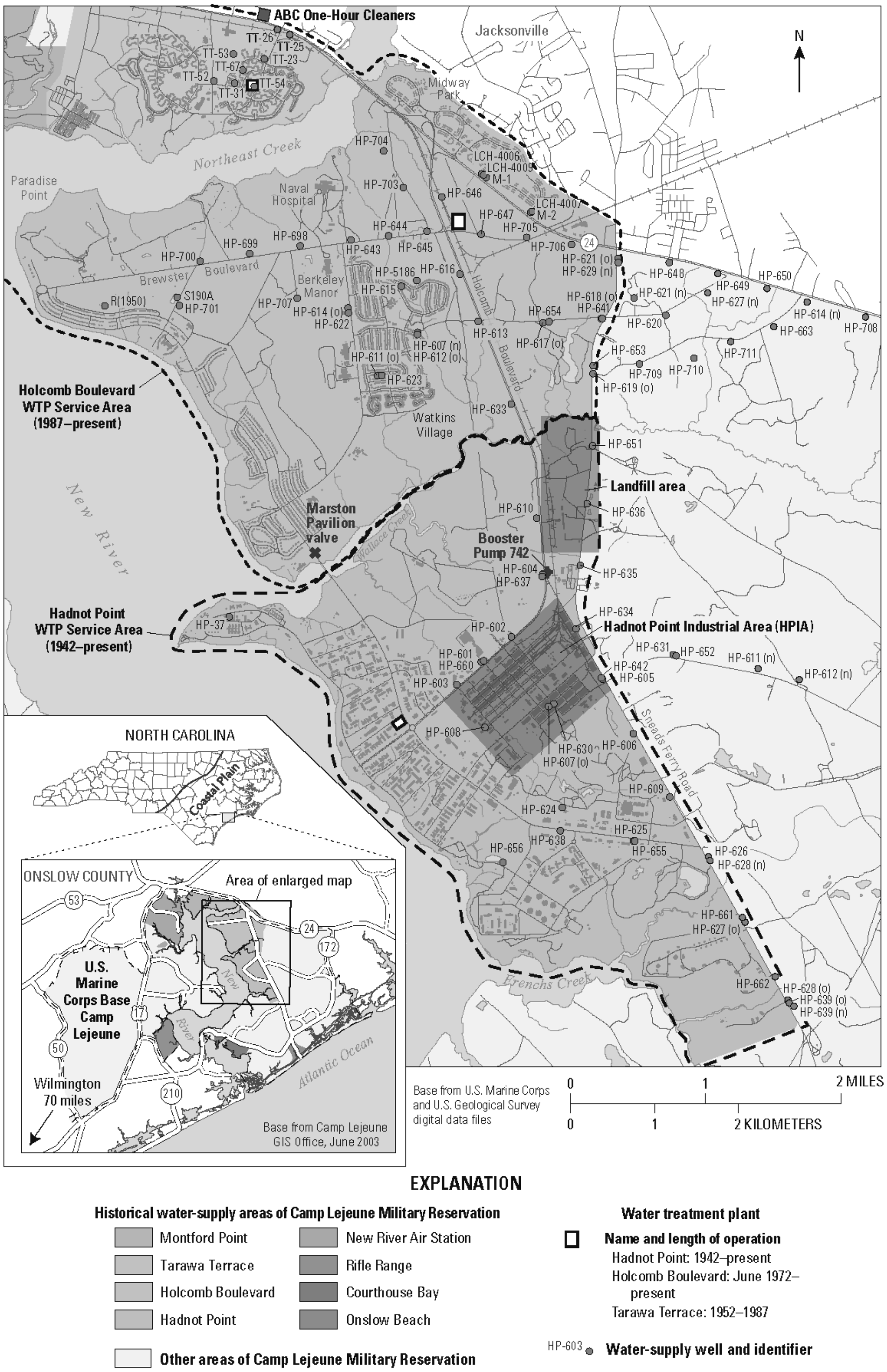

Exhibit I-7. Location Map for Tarawa Terrace, Hadnot Point, and Holcomb Boulevard[26]

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[26] ATSDR (Sautner, Jason B., et al.), March 2013, page S8.3 [CLJA_WATERMODELING_05-0000784401]

4.4.1 <u>Tarawa Terrace</u>

TT-WTP was first operational in 1952.[27] The COCs in the groundwater originated from the disposal of filter waste and spent solvent (PCE) at a private dry-cleaning facility located off-base (ABC One-Hour Cleaners or ABC Cleaners).[28] The release of waste solvent and filter media to the ground and into a septic system gradually made its way deeper into the subsurface and contaminated groundwater beneath. Over time, contaminants dissolved in and were transported with groundwater and impacted supply wells TT-26 and TT-23. Once TT-26 was removed from service in February 1985, contamination continued to be transported past TT-26 to TT-25. Well TT-25 was not contaminated during the period of the Act.[29] The first detection of TT-25 was in 1991. The contaminated groundwater that was not captured by pumping wells continued to migrate in the aquifer toward Northeast Creek which is the natural discharge area for groundwater. The propagation of contamination from ABC Cleaners is discussed under Opinion 3 and illustrated schematically in Exhibit 3-1 under that opinion.

TT-WTP closed in 1987 due the plants age and the requirement of the water supply for Tarawa Terrace.[30] Its water distribution service area was taken over by HB-WTP, which was modernized and expanded in 1985. Contemporary sources indicate that TT-WTP was closed because it was antiquated, expensive to operate, and plagued by high dissolved iron content. Contemporary sources do not support the conclusion that it was closed due to COC contamination.[31]

4.4.2 <u>Hadnot Point</u>

HP-WTP was constructed starting in the early 1940s and was operational starting in 1942.[32] The COCs for the HP-WTP system originated from the use, handling, disposal and incidental leakage of solvents that contained chlorinated volatile hydrocarbons and fuel products that contained benzene. The disposal of waste was a necessary part of routine Base operations.[33] The release of fuel products was from leaky storage tanks and associated piping, which at unknown point(s) in time became defective. The waste disposal and releases resulted in groundwater contamination beneath and near landfills and near storage tanks in the industrial area of the Base.[34] Over time the released COCs impacted soils and groundwater and were transported with groundwater flow. Water pumped from supply wells located downgradient or proximate from

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[27] Brigham Expert Report at Table 1, 11/14/2024, page 23.

[28] U.S. EPA, 09/06/1994, page 9 [CLJA_WATERMODELING_01-0000133944]

[29] Of the fifteen samples, one sample was reported at the trace level of 4.3J ug/L.

[30] [CLJA_WATERMODELING_01-0000125907] and [CLJA_CLW0000006610 – 6623]

[31] Brigham Expert Report at Sec. 4.C; CLJA_WATERMODELING_01-0000286041-42.

[32] Brigham Expert Report at Table 1, 11/14/2024, page 19.

[33] Brigham Expert Report at Sec. 5, 11/14/2024, section 5.B.1.

[34] Environmental Science and Engineering, April 1992, pages x-xiii [CLJA_WATERMODELING_01-0000480570 - 480573]; Environmental Science and Engineering, May 1988, pages 2-5 to 2-7 and A-7 to A-9 [CLJA_WATERMODELING_07-0000352586 - 352588 and CLJA_WATERMODELING_07-0000352635 - 352637]

areas where disposal and releases occurred first became contaminated at some unknown point in time.

4.4.3 Holcomb Boulevard

HB-WTP was first operational in the summer of 1972.[35] The supply wells for HB-WTP were not contaminated.[36] The COCs in the Holcomb Boulevard water distribution system originated from connections with the HP-WTP system when this system was contaminated.

Connections occurred because HB-WTP was occasionally supplemented with water from HP-WTP to meet water demand. Between 1972 and January of 1985, HP-WTP reportedly provided supplemental water to HB-WTP for irrigating two golf courses during the spring and summer months on an as needed basis.[37]

For a period of approximately nine days between January 27 and February 5, 1985, HB-WTP was shut down following a fuel release incident into the HB-WTP treated water reservoir. During that short period of time, the entire water supply for HB-WTP was replaced with water from HP-WTP.[38]

4.5 Available Data from Water Analysis at Camp Lejeune

Prior to the 1980s, drinking water at Camp Lejeune was monitored for the presence of coliform bacteria, turbidity, and certain chemical compounds and parameters that did not include the COCs. The 1974 Safe Drinking Water Act went into effect on June 25, 1977, and with it came requirements to monitor drinking water for certain chemicals contaminants. The first group of volatile organic contaminants for which monitoring became a requirement included total trihalomethanes (TTHMs), for which regulations were entered in 1979 with implementation of the regulatory Maximum Contaminant Level (MCL; 100 ug/L) by November 1982.[39] It is through the investigation of TTHMs in the Base water supplies that the presence of elevated concentrations of COCs in two water supplies was first discovered and positively identified in August 1982.[40]

The first known analysis of the Camp Lejeune drinking water supply for VOCs that included the COCs was in October 1980.[41] On October 1, 1980, water samples collected from the eight WTPs across the Base were picked up by Jennings Laboratory for compositing and analysis. The compositing was done proportionally to the production volumes of the eight systems. For example, the composite sample contained 39%, 18%, and 11% of finished water from HP-, TT-, and HB-WTPs, respectively; the rest was from the five other water supply systems. Analytical

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[35] ATSDR (Maslia, Morris L., et al.), March 2013, page A13 [CLJA_WATERMODELING_01-0000942615]

[36] ATSDR (Faye, Robert E., et al.), March 2013, page D2 [CLJA_WATERMODELING_01-0000936830]

[37] ATSDR (Sautner, Jason B., et al.), March 2013, page S8.51 [CLJA_WATERMODELING_05-0000784449]

[38] Hill, Fred, 01/29/1985, page 1 [CLJA_WATERMODELING_01-0000054259]; Handwritten notes on Building 670, undated [CLJA_WATERMODELING_09-0000141027 - 141028]; Unlabeled Chronology of Events, 02/08/1985 [CLJA_CLW0000004522]

[39] NAVFAC Commander, 07/18/1980 [CLJA_CLW0000000421-023]; Betz, Elizabeth A., 07/29/1982, [CLJA_CLW0000000587-88], 40 C.F.R. 141.64(b) (current TTHM MCL is 0.08 mg/l).

[40] Grainger Laboratories, 08/10/1982 [CLJA_CLW0000000592-95]

[41] Jennings Laboratories, 10/31/1980 [CLJA_CLW0000000430-35]

results reported on October 31, 1980, showed only trace levels of COCs in the composite (TCE reported at 0.005 ug/L; 1,2-DCE at 0.006 ug/L; VC at 0.01 ug/L; PCE not detected; benzene not detected).[42] Even assuming a worst-case scenario that all the reported COCs came from the HP-WTP water, that would yield only trace level COCs in that system.[43] The same can be calculated for each water system and none would show COC concentrations above trace levels. This indicates that none of the water supply systems were contaminated with COCs at that time.[44]

Between October 1980 and September 1981, TTHMs in drinking water supplied by HP-WTP were periodically analyzed (nine samples) by Fort McPherson laboratory.[45] For four of the samples analyzed, the laboratory reported the presence of interfering compounds in the analysis of TTHMs and recommended analysis for organic compounds. Fort McPherson laboratory was not certified or accredited in North Carolina for the analysis of TTHMs, so Grainger laboratory was retained in early 1982 for the analysis of TTHMs in the Base water supply to be able to report to the regulatory agencies. Grainger laboratory reported the intermittent presence of interfering compound(s) that prevented quantification of one of the TTHMs, bromodichloromethane, in drinking water samples from the HP-WTP and TT-WTP systems. The interfering compound(s) were identified by Grainger laboratory in August 1982 to be TCE (HP-WTP System) and PCE (TT-WTP System).[46] The fact that interferences were not always detected likely indicates that TCE and/or PCE were only intermittently present in the water supply between 1980 and 1982, which is consistent with the cycling on and off for the supply wells that were in areas of contaminated groundwater.

An analysis of water samples from all supply wells was performed in 1984/1985.[47] The results showed that several supply wells were found to be contaminated with COCs. Twelve supply wells in the HP-, HB-, and TT-WTP systems were shut down because of contamination during the period of the Act, as summarized in Exhibit I-8.[48]

---

[42] *Id*. [CLJA_CLW0000000430-35]

[43] Calculated worse-case scenario for HP-WTP water are: TCE 0.013 ug/L; 12-DCE 0.015 ug/L; VC 0.026 ug/L; PCE not detected; benzene not detected.

[44] Analytical results reported trace levels of TCE at 0.005 ug/L, VC at 0.010 ug/L, and 12-DCE at 0.006 ug/L. PCE and benzene were not detected. Approximately 57% of the composite sample was from the HP-WTP system. Accounting for dilution and assuming that all contamination was contributed by the HP-WTP system yield only trace level concentrations for HP-WTP (0.009, 0.018, and 0.011 ug/L for TCE, VC, and 12-DCE respectively) at that time. These trace level concentrations are inconsequential relative to the concentrations observed when well HP-651 was in use indicating that the water at HP-WTP and across the Base was not contaminated as indicated by the data.

[45] Betz, Elizabeth A., 02/12/1982 [CLJA_CLW0000000468-69]; Nancy Sonnenfeld Call Record, 01/20/1994, [CLJA_WATERMODELING_01-0000129923]

[46] Grainger Laboratories, 08/10/1982, [CLJA_CLW0000000592-95]

[47] NAVFAC (Bailey, J.R.), 04/25/1986 [CLJA_CLW0000004928 - 4934]

[48] Frazelle, B. M., 04/08/1986 [CLJA_CLW0000001456]; Contaminated Wells at Camp Lejeune, 12/27/2000 [CLJA_CLW0000005020-21]

Exhibit I-8. Contaminated Supply Wells Shutdown During the Period of the Act

Well	System	Date Secured	Primary Contaminant
602	Hadnot Point	11/30/1984	TCE
660(601)	Hadnot Point	12/6/1984	TCE
608	Hadnot Point	12/6/1984	TCE
634*	Hadnot Point	12/14/1984	Methylene Chloride
637*	Hadnot Point	12/14/1984	Methylene Chloride
651	Hadnot Point	2/4/1985	TCE
652	Hadnot Point	2/8/1985	TCE
653	Hadnot Point	2/8/1985	TCE
TT-23 (New Well)	Tarawa Terrace	2/8/1985	PCE
TT-26	Tarawa Terrace	2/8/1985	PCE
645	Hadnot Point	1/13/1987	Benzene
TT-25	Tarawa Terrace	1/14/1987	PCE

a. *Shut down due to methylene chloride contamination. Methylene chloride is not a COC.

The available data for the WTPs and supply wells are provided in Attachment E.

Information on the cycling (on/off) of the supply wells at HP-WTP is only available for a period of 69 days (November 28, 1984 to February 5, 1985).[49] The information is summarized in Exhibit I-9. During that period of time, contaminated well HP-651 was switched on (was pumping) 39% of the time or a pumping frequency of 0.39.

[49] Dated Hadnot Point Well Activation Chart [CLJA_WATERMODELING_07-0000019001 - 19004].

	Nov 1984			Dec 1984																															Jan 1985																															Feb 1985				
HP Well	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5
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633									X	X	X									X	X	X	X	X														X	X	X		X	X							X		X	X	X	X		X					X	X	X	X	X	X	X	X	X	
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639 Old	X	X		X	X	X	X	X															X	X																	X	X																									X	X	
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621									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							X	X	X	X			X	X		X	X	X										X	
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639 (New)	X	X	X		X	X	X	X	X	X	X		X		X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
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Exhibit I-9. Frequency of Use for Supply Wells (Nov. 28, 1984 to Feb. 4, 1985).[50] Supply well HP-651 was on for 27 out of 69 days (0.39 pumping frequency).

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[50] *Id.* Summarized from Dated Hadnot Point Well Activation Chart [CLJA_WATERMODELING_07-0000019001 - 19004].

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In summary. The available COC concentration data in the Base water supply over the period of the Act is limited to:

- Data from the analysis of a composited sample from the eight Base WTPs in operation at the time. The samples were collected on October 1, 1980, and composited in the laboratory for analysis. Results reported only trace levels of COCs (<1 ug/L).
- During the period of the Act, the data for the TT-WTP system is limited to 1982-1986 (55 samples).
- During the period of the Act, the data for the HP-WTP system is limited to July 1982 to December 1987 (93 samples including the samples taken when the system supplied 100% of the HB-WTP system).
- During the period of the Act, the data for the HB-WTP system is limited to a period of nine days between January 29, 1985, to February 7, 1985 (18 samples) when the system was shut down and supplied by HP-WTP.

The COC concentration data in the Base water supply is therefore limited to only a few years over the 34-year period of the Act. This is illustrated in Exhibit I-10 for the samples analyzed for COCs in the treatment and water distribution systems (HP-, HB-, and TT-WTP). The number of samples analyzed for COCs in the water supply wells (HP, HB, and TT) during the period of the Act is illustrated in Exhibit I-11. The COC concentration data for the WTPs and supply wells are provided as Attachment E.

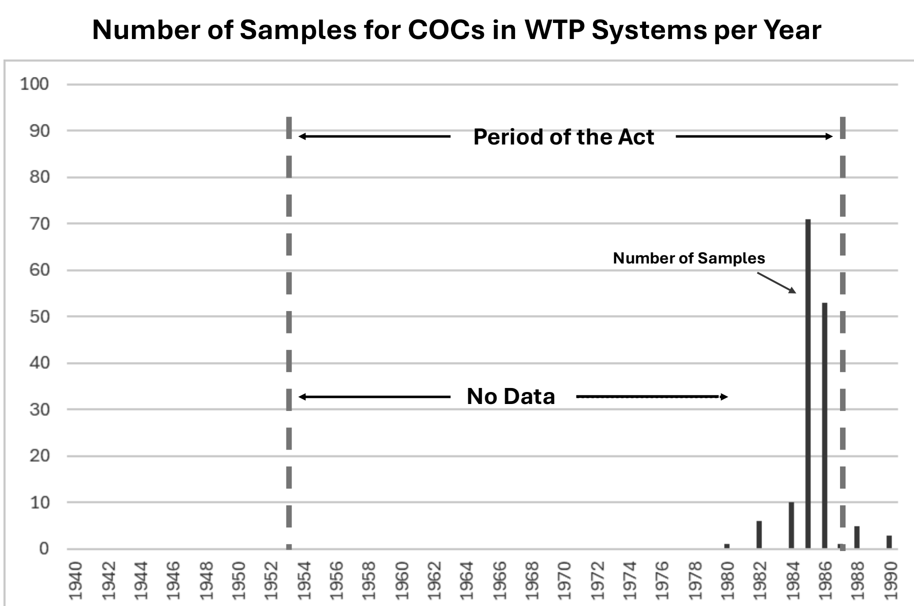

Exhibit I-10. Available COC Concentration Data in Water Supply Systems

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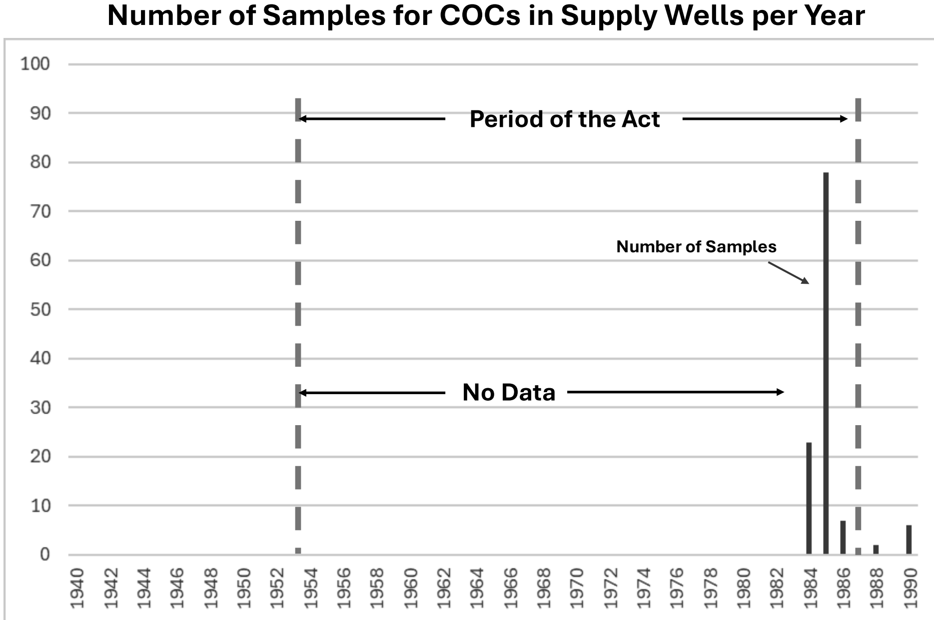

Exhibit I-11. Available COC Concentration Data in Water Supply Wells

Section 5
Bases of Opinions

Opinion 1. The Base Water Supply Systems Other Than Tarawa Terrace, Hadnot Point, and Holcomb Boulevard Were Not Contaminated.

ATSDR concluded that the only Base water supply systems contaminated with the COCs were Tarawa Terrace, Hadnot Point, and Holcomb Boulevard.[51] Plaintiffs' experts did not allege otherwise.[52]

The water distribution plants at the Base other than Tarawa Terrace, Hadnot Point, and Holcomb Boulevard that were active during the period of the Act were: Courthouse Bay; Rifle Range; Onslow Beach; Montford Point/Camp Johnson; Marine Corps Air Station New River; and Camp Geiger.[53] Following my evaluation of the available data and information, I agree with ATSDR on this topic.

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[51] ATSDR's Summary of the Water Contamination Situation at Camp Lejeune, 11/12/2024; https://www.atsdr.cdc.gov/sites/lejeune/watermodeling_summary.html.

[52] Mustafa M. Aral, 10/23/2024; Morris L. Maslia, 10/25/2024; Norman L. Jones and R. Jeffrey Davis, 10/25/2024

[53] Brigham Expert Report at Table 1, 11/14/2024, page 23.

Opinion 2. A Substantial Portion of COCs in the Raw Water Was Unavoidably Lost During Subsequent Storage, Treatment, and Distribution.

During water storage and treatment, the reduction of COC concentrations in the order of 15% to 32% is unavoidable. This is because the COCs are very volatile and preferentially escape to the atmosphere whenever exposure of water to air occurs. COC losses also occur through the disposal of treatment solids and filter backwash water with suspended solids that contain sorbed COCs. Exhibit 2-1 shows a schematic of the water flow through in a water supply system.

There are three main processes or operations that lead to the removal of COCs from the water supply during storage and treatment:

1. Volatilization of COCs to the air;
2. Disposal to waste of spent spiractor solids that contain COCs; and
3. Disposal to waste of sand filter backwash water and suspended solids that contain COCs.

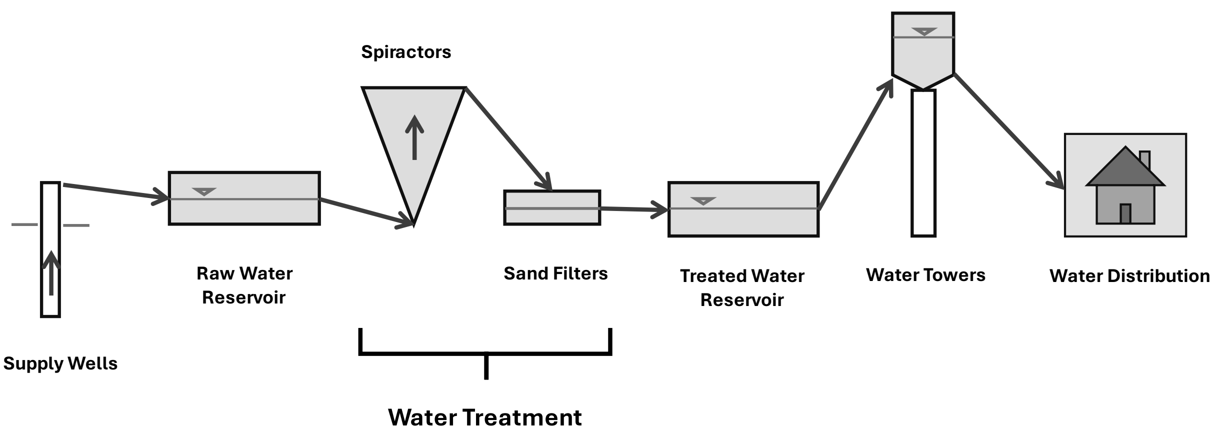

Exhibit 2-1. Flow Through Schematic for Water from Supply Wells to Distribution

<u>COCs Volatilization Losses</u>

The volatilization or evaporation of COCs to the air during water storage and treatment is unavoidable. The COCs are highly volatile chemicals[54] that preferentially partition to the air rather than remaining dissolved in the water. The physical conditions for water storage, treatment, and distribution allow for air-water exchanges that result in COCs leaving the water for the air. COC volatilization to the air takes place in the reservoirs, water towers, sand filters, and effluent at the top of the spiractors.

The magnitude of COCs reduction in the water depends on the properties of each COC, including the COC affinity to volatilize to the air and its solubility in water. These two properties are combined as a ratio referred to as the Henry's Law constant for each COC. The Henry's Law

[54] Using the definition of "highly volatile" from Thomas (1990), which affects the selection of the volatilization estimation method.

constant is used to calculate the concentrations of a COC in air and water at equilibrium. Evaporative losses also depend on temperature, pressure, and the rates of diffusion of the COC in air and water.

ATSDR did not account for the reduction of COC concentrations in its water modeling reports that portend to simulate estimated average monthly COC concentrations in the water supply. ATSDR only simulated the COC concentrations in the blend of water (raw water) from several supply wells before any reduction of COC concentrations due to volatilization in water storage and treatment. For reasons that are not explained, the ATSDR ignored the results of a report that it commissioned.[55] This ATSDR-commissioned report concluded that the dominant evaporative loss in the Camp Lejeune treatment plants was at the effluent of the spiractors, though there would also have been other volatilization losses elsewhere in the systems.

Methods for calculation of volatilization rates from water to air under various situations are described in the literature.[56,57] The water entering the effluent pipe that goes to the spiractor approximates the conditions of a water weir. Evaporative losses at a water weir can be modeled using the Nakasone (1987)[58] method as implemented by U.S. Environmental Protection Agency's (USEPA's) Water9 software.[59] This approach is similar to the approach used in the ATSDR-commissioned report to estimate evaporative losses at the spiractor effluent; a diagram of a spiractor effluent pipe from the ATSDR-commissioned report is shown in Exhibit 2-2.[60]

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[55] i.e., AH Environmental Consultants, December 2004 [CLJA_WATERMODELING_01-0000071446 - 71512]

[56] Thomas, R.G. 1990. Volatilization from Water. In: Lyman, W.J. et al., Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

[57] U.S. EPA. 2006. WATER9, Version 3.0. https://www.epa.gov/chief/water9-version-30. Accessed November 17, 2024.

[58] Nakasone, H., 1987. Study of aeration at weirs and cascades. Journal of environmental engineering, 113(1), pp.64-81.

[59] The same approach was applied in a report commissioned by ATSDR for this exact purpose (AHEC, 2004).

[60] AH Environmental Consultants, December 2004, page 3-10 [CLJA_WATERMODELING_01-0000071475]

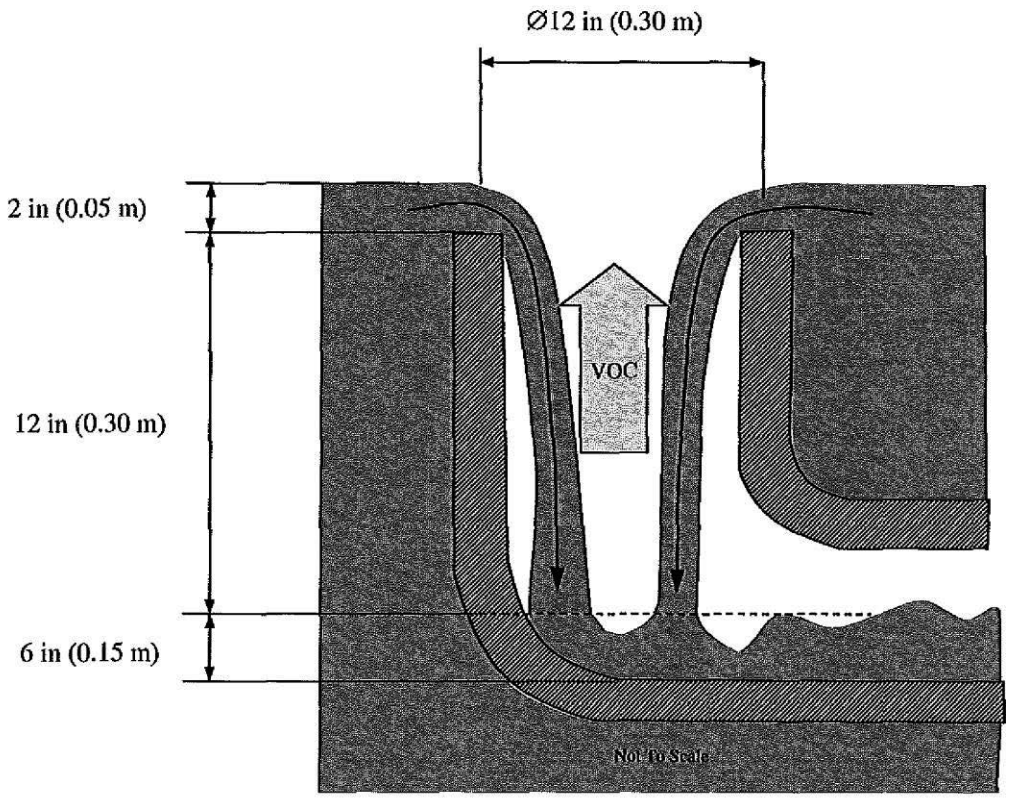

Exhibit 2-2. Schematic of a Spiractor Effluent Pipe Modeled as a Weir (after AHEC, 2004)

The properties of the COCs that are relevant to the calculation of volatilization and COC concentration reduction are summarized in Attachment C and the results are described below.

<u>COC Concentrations Reduction at the Spiractor Effluent Pipe</u>

To calculate the reduction of COC concentrations due to volatilization, the USEPA's Water9 modeling software is used with the model inputs provided in Attachment C. The specific inputs to the calculations consist of:

- dimensions of the spiractor effluent pipe;
- water flow rate out of a spiractor; and
- COC-specific properties.

The dimensions of the spiractor effluent pipe were measured on a pipe that was being replaced, as illustrated in Exhibit 2-3a and b, and at the top of a spiractor that was not in operation. The water flow out of a spiractor at the WTPs is reported at 700 gallons per minute (gpm).[61]

[61] The Permutit Company, October 1971, page 1 [CLJA_WATERMODELING_07-0001125658]

COC concentration reductions from volatilization in the spiractor effluent pipe are calculated to be in the order of 8 to 19% range depending on the COC as described in Attachment C. Results for all COCs are summarized in Exhibit 2-4 for HP-WTP and Exhibit 2-5 for TT-WTP.

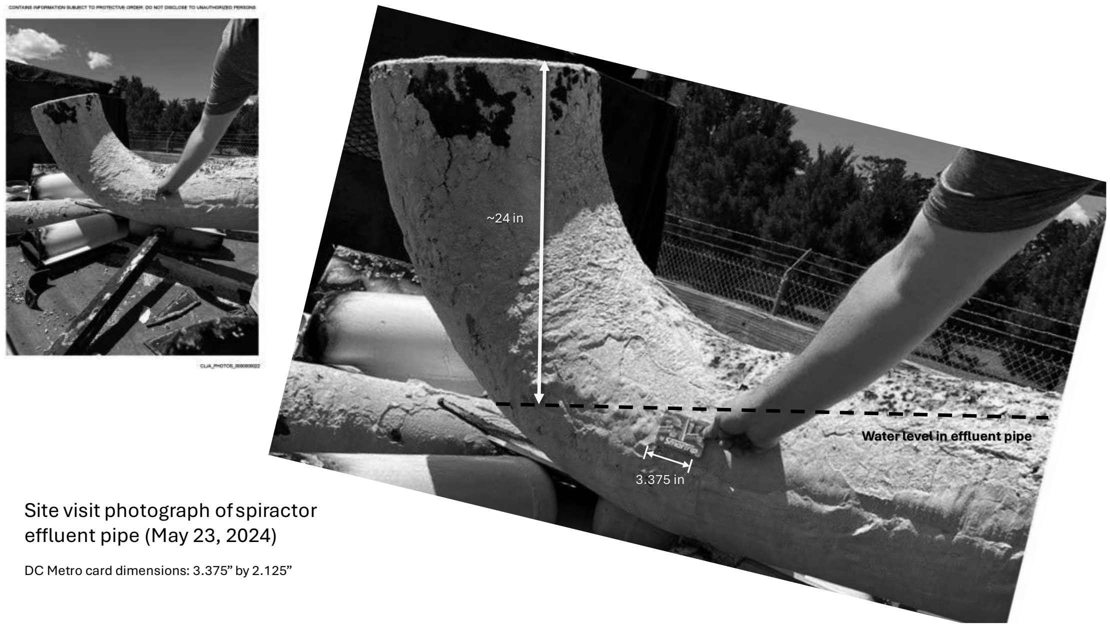

Exhibit 2-3a. Removed Spiractor Effluent Pipe

Exhibit 2-3b. Spiractor Effluent Pipe in Place

Exhibit 2-4. COC Volatilization Losses at HP-WTP

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Henry's Law Constant*	atm*m3 /mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	8.13E-02	8.90E-02	8.64E-02	1.03E-01	9.82E-02
Reaeration coefficient ratio (Thomas Table 15-2)***	[-]	0.52	0.57	0.77	0.86	0.57
Oxygen reaeration coefficient (Thomas Table 15-3)	1/h	0.008	0.008	0.008	0.008	0.008
Volatilization coefficient (Thomas Equation 15-22)	1/h	0.0028	0.0033	0.0052	0.0062	0.0033
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3 /mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Spiractor:						
Pipe Diameter	M	0.3	0.3	0.3	0.3	0.3
Pipe Circumference	M	0.94	0.94	0.94	0.94	0.94
Critical Depth above Weir	M	0.05	0.05	0.05	0.05	0.05
Fall Height Z (60 cm + 1.5x5cm critical depth)	M	0.675	0.675	0.675	0.675	0.675
Tailwater Depth h	M	0.15	0.15	0.15	0.15	0.15
Flow Rate	m3/h	157.73	157.73	157.73	157.73	157.73
Flow Rate per Length of Weir q	m2/h	167.79	167.79	167.79	167.79	167.79
Deficit Ratio ln(r) (AHEC Equation 11, corrected)	[-]	0.2334	0.2334	0.2334	0.2334	0.2334
Liquid Mass Transfer Coefficient k_l (AHEC Equation 10)	m/s	0.0144	0.0154	0.0192	0.0214	0.0161
Gas Mass Transfer Coefficient k_g (AHEC Equation 9)	m/s	0.0441	0.0469	0.0459	0.0515	0.0500
Overall Mass Transfer Coefficient K_0 (AHEC Equation 8)	m/s	9.01E-03	7.28E-03	8.15E-03	1.46E-02	5.80E-03
Fraction Remaining (Ci/C0) (AHEC Equation 7)	[-]	0.8777	0.8999	0.8887	0.8089	0.9194
Removal (1-Ci/C0)	[-]	**12.23%**	**10.01%**	**11.13%**	**19.11%**	**8.06%**
Finished Reservoir						
Residence time (2.5 million gallons total, 5 MGD flow)	H	12	12	12	12	12

Exhibit 2-4. COC Volatilization Losses at HP-WTP

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9668	0.9617	0.9390	0.9279	0.9617
Removal (1-Ci/C0)	[-]	**3.32%**	**3.83%**	**6.10%**	**7.21%**	**3.83%**
Water Tower						
Residence time (300,000 gal tank, 1.25 MGD flow)	H	5.76	5.76	5.76	5.76	5.76
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9839	0.9814	0.9703	0.9647	0.9814
Removal (1-Ci/C0)	[-]	**1.61%**	**1.86%**	**2.97%**	**3.53%**	**1.86%**
Raw Water Reservoir						
Residence time (800,000 gal tank, 5 MGD flow)	H	3.84	3.84	3.84	3.84	3.84
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9893	0.9876	0.9801	0.9763	0.9876
Removal (1-Ci/C0)	[-]	**1.07%**	**1.24%**	**1.99%**	**2.37%**	**1.24%**
Re-carbonation Basin Without Bubbling of CO2 (Flow Through Basin):						
Residence time (AHEC, 2004)	H	0.08	0.08	0.08	0.08	0.08
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9998	0.9997	0.9996	0.9995	0.9997
Removal (1-Ci/C0)	[-]	**0.02%**	**0.03%**	**0.04%**	**0.05%**	**0.03%**
Sand Filter:						
Residence time (AHEC, 2004)	H	0.33	0.33	0.33	0.33	0.33
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9991	0.9989	0.9983	0.9979	0.9989
Removal (1-Ci/C0)	[-]	**0.09%**	**0.11%**	**0.17%**	**0.21%**	**0.11%**
Overall Evaporative Removal		**18.34%**	**17.07%**	**22.41%**	**32.48%**	**15.12%**

a. *Sources: AHEC (2004) for TCE and PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC and DCE, method by Peng and Wang (1997) for benzene.

b. **Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al., 1994a,c for DCE and VC.

c. ***Values for VC and 1,2-tDCE are interpolated based on the ratio of diffusion coefficient in water to that of oxygen at 20 degrees C (1.76x10^-5 cm2/s) from Han and Bartels (1996).

Exhibit 2-4. COC Volatilization Losses at HP-WTP

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene

References:

d. AH Environmental Consultants Inc. 2004. ATSDR Support - Estimation of VOC Removal, Marine Corps Base Camp Lejeune, North Carolina. December. [CLJA_WATERMODELING_01-0000071446 - 71512].

e. Chiao et al. 1994a. Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, 1,1 Dichloroethylene. California DTSC. December.

f. Chiao et al. 1994c. Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, Vinyl Chloride. California DTSC. December.

g. EPA. 2021. Parameter Estimating Tool - Estimated Henry's Law Constants. https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html. Accessed 10/10/2024.

h. Hadnot Point water treatment information [CLJA_WATERMODELING_07-0000003169].

i. Han, P. and D.M. Bartels. 1996. Temperature dependence of oxygen diffusion in H2O and D2O. The Journal of physical chemistry, 100(13), pp. 5597-5602.

j. Nakasone, H. 1987. Study of aeration at weirs and cascades. Journal of environmental engineering, 113(1), pp. 64-81.

k. Peng and Wan. 1997. ES&T Vol. 31. pp. 2998-3003.

l. Thomas. 1990. Volatilization from Water. In: Lyman, W.J. et al., Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

m. Washington, J.W. 1996. Ground Water. Vol. 34. pp. 709-718.

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Exhibit 2-5. COC Volatilization Losses at TT-WTP

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Henry's Law Constant*	atm*m3 /mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	8.13E-02	8.90E-02	8.64E-02	1.03E-01	9.82E-02
Rearation coefficient ratio (Thomas Table 15-2)***	[-]	0.52	0.57	0.77	0.86	0.57
Oxygen rearation coefficient (Thomas Table 15-3)	1/h	0.008	0.008	0.008	0.008	0.008
Volatilization coefficient (Thomas Equation 15-22)	1/h	0.0028	0.0033	0.0052	0.0062	0.0033
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3 /mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Spiractor Variables						
Pipe Diameter	m	0.3	0.3	0.3	0.3	0.3
Pipe Circumference	m	0.94	0.94	0.94	0.94	0.94
Critical Depth above Weir	m	0.05	0.05	0.05	0.05	0.05
Fall Height Z (60 cm + 1.5x5cm critical depth)	m	0.675	0.675	0.675	0.675	0.675
Tailwater Depth h	m	0.15	0.15	0.15	0.15	0.15
Flow Rate	m3/h	157.73	157.73	157.73	157.73	157.73
Flow Rate per Length of Weir q	m2/h	167.79	167.79	167.79	167.79	167.79
Deficit Ratio ln(r) (AHEC Equation 11, corrected)	[-]	0.2334	0.2334	0.2334	0.2334	0.2334
Liquid Mass Transfer Coefficient k_l (AHEC Equation 10)	m/s	0.0144	0.0154	0.0192	0.0214	0.0161
Gas Mass Transfer Coefficient k_g (AHEC Equation 9)	m/s	0.0441	0.0469	0.0459	0.0515	0.0500
Overall Mass Transfer Coefficient K_0 (AHEC Equation 8)	m/s	9.01E-03	7.28E-03	8.15E-03	1.46E-02	5.80E-03

Exhibit 2-5. COC Volatilization Losses at TT-WTP

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Fraction Remaining (Ci/C0) (AHEC Equation 7)	[-]	0.8777	0.8999	0.8887	0.8089	0.9194
Removal (1-Ci/C0)	[-]	**12.23%**	**10.01%**	**11.13%**	**19.11%**	**8.06%**
Finished Reservoir						
Residence time (0.75 million gallons, 1 MGD flow)	h	18	18	18	18	18
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9507	0.9431	0.9100	0.8938	0.9431
Removal (1-Ci/C0)	[-]	**4.93%**	**5.69%**	**9.00%**	**10.62%**	**5.69%**
Water Tower						
Residence time (250,000 gal tank, 1 MGD flow)	h	6	6	6	6	6
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9833	0.9807	0.9690	0.9633	0.9807
Removal (1-Ci/C0)	[-]	**1.67%**	**1.93%**	**3.10%**	**3.67%**	**1.93%**
Overall Removal by Volatilization		**18.84%**	**17.63%**	**23.23%**	**33.41%**	**15.68%**

a. *Sources: AHEC (2004) for TCE, PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC, DCE, method by Peng and Wang (1997) for benzene.

b. **Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al. 1994a,c for DCE, VC.

c. ***Values for VC and 1,2-tDCE are interpolated based on the ratio of diffusion coefficient in water to that of oxygen at 20 degrees C (1.76x10^-5 cm2/s) from Han and Bartels (1996).

References:

d. AH Environmental Consultants Inc. 2004. ATSDR Support - Estimation of VOC Removal, Marine Corps Base Camp Lejeune, North Carolina. December. [CLJA_WATERMODELING_01-0000071446 - 71512].

e. Chiao et al. 1994a. Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, 1,1 Dichloroethylene. California DTSC. December.

f. Chiao et al. 1994c. Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, Vinyl Chloride. California DTSC. December.

g. EPA. 2021. Parameter Estimating Tool - Estimated Henry's Law Constants. https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html. Accessed 10/10/2024.

h. Han, P. and D.M. Bartels. 1996. Temperature dependence of oxygen diffusion in H2O and D2O. The Journal of physical chemistry, 100(13), pp. 5597-5602.

Exhibit 2-5. COC Volatilization Losses at TT-WTP

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene

i. Nakasone, H. 1987. Study of aeration at weirs and cascades. Journal of environmental engineering, 113(1), pp. 64-81.

j. Peng and Wan. 1997. ES&T Vol. 31 pp. 2998-3003.

k. Tarawa Terrace water treatment information [CLJA_WATERMODELING_07-0000003183].

l. Thomas. 1990. Volatilization from Water. In: Lyman, W.J. et al., Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

m. Washington, J.W. 1996. Ground Water. Vol. 34. pp. 709-718.

Other Volatilization Losses

There are other unavoidable reductions in COC concentrations due to volatilization to the air in the water storage reservoirs (i.e., raw water reservoir, finished water reservoir, and water towers), as well as the re-carbonation basin and sand filters. These losses are likely less than for the spiractor effluent pipes due to more quiescent water flow conditions in the reservoirs and shorter residence times in the re-carbonation basin and sand filters.

For example, volatilization loss for TCE in the HP-WTP water reservoirs is estimated to be in the order of 1% to 4% in each reservoir depending on the residence time of the water. For example, using a residence time of 12 hours in the 2.5 million gallon volume across two finished water reservoirs at the HP-WTP,[62] and applying the method outlined by Thomas (1990)[63] to calculate evaporative losses for highly volatile chemicals, yields a 4% reduction for TCE concentration in the water.[64] A similar approach applied to the raw water reservoir, water towers,[65] re-carbonation basin when carbon dioxide is not being bubbled through to lower the pH of the water, and the gravity sand filters where residence time for water is shorter, yields calculated reductions in TCE concentrations in water in the order of 1%, 2%, 0.03% and 0.1%, respectively. Calculation results are provided in Attachment C.

The HP-WTP was constructed as a state-of-the-art plant in 1942.[66] The plant included a re-carbonation basin that received the spiractor effluent prior to discharging to the sand filters. The re-carbonation basin's purpose was to aerate the water using carbon dioxide through to lower the water's pH. The re-carbonation basin remains at the plant as a flow-through basin, but the water

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[62] Residence time for the WTPs is provided in the report on evaporative losses commissioned by the ATSDR.

[63] Thomas, R.G. 1990. Volatilization from Water. In: Lyman, W.J. et al., Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

[64] The COCs fit the definition of highly volatile chemical given that their Henry's Law constants are greater than 10^{-3} atm*m^3/mol. AHEC's approach incorrectly used the Southgate method that was developed for semi-volatile chemicals as described by Thomas (1990).

[65] There are four water towers at the HP-WTP, each holds 300,000 gallons of water. For this calculation it was assumed that the 5 MGD flow was split evenly among the four water towers, yielding a residence time of 5.76 hours in each water tower.

[66] Brigham Expert Report.

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is not presently aerated with carbon dioxide. It is likely that re-carbonation was used at least in the 1950s and likely later because a re-carbonation basin was included in the construction of the MCAS-WTP in 1954.[67] However, there is limited information or testimony about when it was used. When in use, the re-carbonation of water would likely have removed most (i.e., 90% removal or more) of the dissolved COCs from the water. The aeration of water or air stripping, is a well proven treatment technology to remove VOCs from water.[68,69]

The total estimated reduction of COC concentrations in water through volatilization to the air is summarized in Exhibit 2-4 for the HP-WTP system[70] and Exhibit 2-5 for the TT-WTP system.

<u>Sorption Losses in the Spiractor</u>

A spiractor is a vessel used for water softening treatment which is for the removal of iron and other metals by adding lime to raw water.[71] The spiractors are loaded with a catalyst sand through which the water flows upward. Lime is added to the water that enters the spiractor which results in the precipitation of minerals and mineral coatings in the spiractor. The mineral precipitates (i.e., carbonate and oxyhydroxide minerals) remain in the spiractor with the catalyst sand. A portion of the COCs in the water precipitate or sorb on the minerals and are thereby removed from the water.[72] The catalyst sand combined with the precipitates and other materials that sorb on the catalyst (sand) are referred to as the spiractor solids.

The spiractor solids increase in volume due to the accumulation of mineral precipitates. The volume of the spiractor solids increases by a factor of 3 to 4 over time. The spiractor solids had to be fully replaced and disposed of approximately every 2 months (1,300 to 1,500 hours of operation). Furthermore, a truck load of solids had to be removed twice a week from each spiractor. The solids removed were disposed of as waste.[73,74] The disposal of spent spiractor solids contained the sorbed COCs that were removed from the water.

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[67] MCAS-WTP entered service in 1954. Table 1 of Dr. Brigham's report. MCAS-WTP included a re-carbonation basin. CLJA_WATERMODELING_07-0000003137.

[68] U.S. EPA (Russell, Hugh H., et al.), January 1992, pages 4-5 [CLJA_WATERMODELING_05-0000202955 - 202956]

[69] ATSDR (Maslia, Morris L.), December 2009, page 29 [CLJA_WATERMODELING_05-0000783875]; ATSDR, 04/30/2009, pages 179-181 [CLJA_WATERMODELING_01-0000013348 – 13350]

[70] The calculated removal of COCs due to volatilization as presented in Attachment C and Exhibit 2.4 does not include volatilization losses under the conditions of active bubbling of carbon dioxide in the water passing through the re-carbonation basin.

[71] The Permutit Company, October 1971, page 3 and page 3 of Bulletin 2384D [CLJA_WATERMODELING_07-0001125662 and 1125674]; Peirson & Whitman, 05/12/1952, pages 61-63 [CLJA_WATERMODELING_07-0001252390 - 1252392]

[72] Schwarzenbach et al., 1993; pp. 284-291.

[73] AH Environmental Consultants, October 2000, page 5-20 [CLJA-WATERMODELING_07-0000419874]: "Change the catalyst after about 1350 to 1500 hours, and waste remove excess catalyst each week, as necessary"; NAVFAC Commander, 05/29/1986, enclosure 1, page 2 [CLJA_CLW0000004938]: "The spiractors use beach sand as a catalyst. The sand is replaced every 1,500 hours of operation"

[74] The Permutit Company, October 1971, pages 1-7, [CLJA_WATERMODELING_07-0001125658 - 1125670]

The raw water unavoidably contains suspended solids and organic matter. For example, in the Castle Hayne formation, groundwater is reported to contain 3.4 milligrams per liter (mg/L) of organic matter.[75] COCs have a strong affinity for organic matter and a portion of the COCs is sorbed to the organic matter.[76,77] Suspended materials are likely to be sequestered in the spiractor solids and disposed of with the solids therefore removing additional COCs from the water.

I am aware of no data available on COC concentrations in the spent spiractor solids. Based on my education and experience, a best estimate of COC losses with the disposal of spent spiractor solids is likely to be significant but less than the volatilization losses. The ATSDR did not take this into account.

Filter Backwash Water

The effluent of the spiractors goes to the gravity sand filters or pressure filters. The purpose of the filters is to remove suspended solids in the water by passing the water through filtering media. At HP-WTP, the filtering media is made of sand and other solid materials of different grain sizes and densities. The suspended solids removed by the filters unavoidably contain a portion of the COCs due to sorption onto and co-precipitation into the suspended solids. Each sand filter at HP-WTP is backwashed every 48 hours to unclog the filters from trapped solids[78] and the backwash water is disposed to waste. A portion of the COCs is thus removed from the treated water with the disposal of the sand filters' backwash water.

There is no data available on COC concentrations in the filters' backwash water. Based on my education and experience, a best estimate of COC losses with the disposal of the filters' backwash water is likely less than the volatilization losses but non-negligible considering the high frequency of backwashing which is necessary to remove the trapped solids from the filters.

ATSDR estimated concentrations in raw water prior to water treatment, storage, and distribution. ATSDR did not address the treatment and storage losses that are unavoidable during treatment and storage of the water for distribution. Ignoring for the sake of discussion only the shortcomings of the ATSDR models that result in exaggerated and uncertain COC concentrations in the raw water but accounting for the reduction in COCs during water treatment and storage yields substantially lower COC concentrations in the water for distribution. The concentration reduction for each COC is shown in Exhibit 2-6 using a generic concentration of 100 ug/L for the raw water.[79] For example, the data indicate that for raw water containing a concentration of 100 ug/L TCE, the water supplied to customers would contain only 83 ug/L TCE; for VC, the water

[75] Geophex, Ltd., June 1994, page 32.

[76] Delle Site, A., 2001. Factors affecting sorption of organic compounds in natural sorbent/water systems and sorption coefficients for selected pollutants. A review. Journal of Physical and Chemical Reference Data, 30(1), pp.187-439.; Clausen, L., Fabricius, I. and Madsen, L., 2001. Adsorption of pesticides onto quartz, calcite, kaolinite, and α-alumina. *Journal of environmental quality*, *30*(3), pp. 846-857.

[77] Karickhoff, S.W., 1984. Organic pollutant sorption in aquatic systems. Journal of hydraulic engineering, 110(6), pp.707-735.

[78] CLJA_CLW0000004947.

[79] The values shown in Exhibit 2-6 are for evaporative losses only and do not account for the additional sorption and filter backflush losses. The treatment COC loss values for HP-WTP are used in the example.

supplied would contain only 68 ug/L VC. The raw water that contains no COCs would of course not contain any COCs when supplied to customers.

COC Concentration Reductions During Water Treatment, Storage, and Distribution (Evaporative Losses Only)

	PCE	TCE	12-DCE	VC	Benzene
COCs in Raw Water	100	100	100	100	100
COCs in Treated Water	82	83	78	68	85
Treatment Losses (see Attachment C)	18.34%	17.07%	22.41%	32.48%	15.12%

Exhibit 2-6. COC Concentration Reductions Between Raw Water and the Distributed Water After Treatment and Storage

Opinions for Tarawa Terrace

Opinion 3. The TT-WTP System Likely Became Contaminated in the 1970s When the COCs Reached Supply Well TT-26 and Ended on February 8, 1985 When TT-26 Was Shut Down.

TT-WTP operated from 1952 until March 1987 when the plant was shut down.[80] The main contaminant identified in the TT-WTP system was PCE. The source of the contamination in the water supply was identified to be ABC One Hour Cleaners, a privately-owned dry-cleaning operation located off-Base.[81] The facility used PCE as a solvent for dry-cleaning and dry-cleaning operations are documented in the literature.[82] Waste filter media containing PCE was reportedly disposed of in potholes around the facility, and the effluent from a solvent/water separator was discharged to a septic system that ultimately drained into the ground.[83] ABC Cleaners was on the National Priority List and was the subject of a 1993 Record of Decision.[84]

ABC Cleaners started operations in mid-1954.[85] The release of waste materials containing PCE at ABC Cleaners was gradual.[86] The released PCE first accumulated in the septic tank and shallow soils and some of it infiltrated deeper into the soil to reach the water table and contaminate

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80 Brigham Expert Report at Table 1.

81 ATSDR (Maslia, Morris L.), July 2007, page A4 and A10 [CLJA_WATERMODELING_09-0000615655 and CLJA_WATERMODELING_09-0000615661]

82 e.g., U.S. EPA, September 1995, page 13 [CLJA_WATERMODELING_01-0000086739]; U.S. EPA., May 1973, Ch. 12 Organic solvent Emitting Equipment of EPA's Air Pollution Engineering Manual, 2nd Ed; U.S. EPA, December 1978, EPA-450/2-78-050.

83 Victor John Melts Deposition, 04/12/2001, pages 21 and 68-69 [ATSDR_WATERMODELING_01-0000893200 and ATSDR_WATERMODELING_01-0000893247 - 893248]; U.S EPA, 01/26/1993 at pages 8-9 [CLJA_WATERMODELING_01-0000134631 - 134632].

84 U.S EPA, 01/26/1993 [CLJA_WATERMODELING_01-0000134624 - 134652].

85 Brigham Expert Report at Sec. 4.B.

86 North Carolina Department of Natural Resources and Community Development (Shiver, Rick), December 1985 [CLJA_CLW0000004840]

the shallow groundwater. Once in groundwater, dissolved PCE was transported with groundwater in the direction of flow toward Northeast Creek, which is the natural groundwater discharge area. A PCE contamination plume first developed in the shallow groundwater. Pumping of supply wells in the aquifer below the confining layer that separates the shallow aquifer from the pumped aquifer resulted in a downward hydraulic gradient that induced PCE to migrate through the confining layer and reached the pumped aquifer. A PCE groundwater plume gradually developed in the pumped aquifer and ultimately led to the contamination of well TT-26, which is screened (open to allow groundwater to flow into the well) in the pumped aquifer. A conceptual representation of the subsurface between ABC Cleaners and supply well TT-26 is shown in Exhibit 3-1.

Travel Time for PCE to Reach Well TT-26.

The transport of dissolved PCE in the shallow aquifer (L1 in Exhibit 3-1), through the low permeability clay layer (L2), and then through the pumped aquifer (L3) to supply well TT-26 took several years. The travel time for PCE to reach TT-26 from ABC Cleaners is calculated for three representative flow paths. The parameters for calculation are:

- Site-specific parameters for hydraulic gradient (i) from potentiometric surfaces;
- Permeability (K) for Layers L1, L2, and L3;
- Aquifer porosity (n);
- Distance (L) to represent site conditions through which groundwater flows between ABC Cleaners and supply well TT-26, which is screened (opened for groundwater to flow into the well) in Layer L3;
- Retardation Factor for PCE derived from:
  - Site-specific organic carbon (foc);
  - Bulk density (Db) for the aquifer materials; and
  - Sorption partition coefficient for PCE (Koc).

Using these parameters, which are the same as for the Hadnot Point/Holcomb Boulevard ATSDR model (with the exception of foc, which is derived from site-specific data), along three representative flow paths yields travel times for PCE between ABC Cleaners and TT-26 that are in the 15 to 25 years range. The representative flow paths considered to represent PCE transport in groundwater are illustrated in Exhibit 3-1. The site-specific data for foc is summarized in Exhibit 3-2. Supporting materials for the calculated travel times are provided in Attachment D. Travel time of 15 to 25 years for PCE indicates that the arrival of elevated PCE concentrations at supply well TT-26 likely occurred in the 1970s.

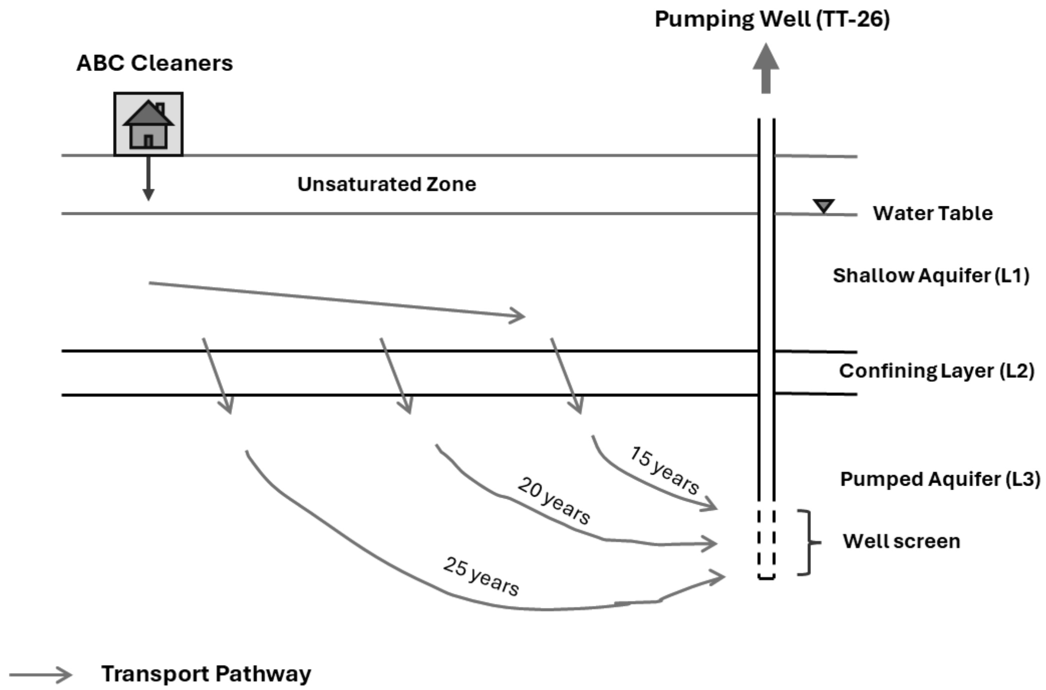

Exhibit 3-1. Conceptual Illustration for PCE Transport Between ABC Cleaners and Well TT-26

Exhibit 3-2. Site-Specific Data for K_d

Sample	Date Sampled	Depth (ft)	TOC (mg/kg)	f_{oc}
SWMU253-TW02	3/22/2002	10	2,005	0.002005
SWMU254-SS01*	7/18/2000	10	3,060	0.00306
SWMU265-GW02	3/24/2002	10	976	0.000976
BLDG902-SB03-10-11-07B	5/19/2007	10.5	810	0.00081
SWMU360-TW04	3/25/2002	12	875	0.000875
SWMU43-GW02	3/25/2002	12	719	0.000719
SWMU258-GW02	7/18/2000	14	30,400	0.0304
SWMU261-GW02	7/18/2000	14	3,930	0.00393
SWMU43-GW01	7/18/2000	14	589	0.000589
SWMU43-GW02	7/17/2000	14	341	0.000341
SWMU43-GW03*	7/17/2000	14	382.5	0.000383
IS26-04	11/21/1997	16.5	1,510	0.00151
IS26-05	11/21/1997	18	5,560	0.00556
IS26-06	11/21/1997	19	6,420	0.00642
BLDG902-SB03-25-26-07B	5/19/2007	25.5	210	0.00021
BLDG902-SB03-43-44-07B	5/20/2007	43.5	300	0.0003
BLDG902-SB03-46-47-07B	5/20/2007	46.5	24,000	0.024
BLDG902-SB03-55-56-07B	5/20/2007	55.5	1,300	0.0013
BLDG902-SB03-83-84-07B	5/20/2007	83.5	1,200	0.0012
BLDG902-SB03-100-101-07B	5/20/2007	100.5	28,000	0.028
BLDG902-SB03-120-121-07B	5/20/2007	120.5	2,600	0.0026
		Median	1,300	0.00130

*Average of two duplicates

After February 1985, Tarawa Terrace Water Supply Was Not Contaminated. The Exception Was for a 24-Hour Use of TT-23 in March 1985 and Three 7-Hour Use Periods in April 1985.

COC concentrations in water samples from TT-WTP were measured in 1982 and 1985 (six samples), with an average PCE concentration of 106 ug/L.

After February 8, 1985, 49 samples were taken and analyzed. PCE was either not detected or reported only at trace levels below the method detection limit with the exception of samples taken on March 12, 1985, when contaminated supply well TT-23 was intentionally pumped for a period of 24 hours during a water shortage.[87]

The available data for the TT-WTP system demonstrates that the water supply was not routinely contaminated after February 8, 1985, as shown in Exhibit 3-3. After that date, PCE was either not detected or only reported at low levels. Two sets of samples (upstream and downstream of the blended water reservoir) were taken on March 12, 1985, when TT-23 was being pumped for 24 hours to prevent a water shortage.[88] The results were to quantify the effect of pumping contaminated well TT-23 on the quality of the raw water reservoir. The results from samples analyzed by two laboratories were 20.0 and 21.3 ug/L PCE for the influent, and 6.6 and 8.9J ug/L for the effluent sample locations. These results are not representative of the average PCE concentration in the water supply because well TT-23 was not regularly pumped.

It is noted that in 1980 and 1981 (Fort McPherson laboratory) and 1982 through 1984 (Grainger laboratory), when analyzing water for the presence of TTHMs, the laboratories reported the intermittent presence of an interfering compound. PCE was identified as the interfering compound in August 1982.[89] This information indicates that PCE might likely have been intermittently present in the water supply in the early 1980s.

The COCs other than PCE were analyzed in 51 samples. Results indicate that these COCs were either not detected or reported at trace levels below the method detection limit (a sample taken on February 5, 1985, reported TCE and 1,2-DCE concentrations of 8.1 and 12 ug/L, respectively).

The data for COC concentrations in the TT-WTP system are summarized in Exhibit 3-3.

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[87] Operational History of Tarawa Terrace supply well TT-23, undated, page 3 [CLJA_WATERMODELING_01-0000489792]

[88] Frazelle, B.M., 03/12/1985 [CLJA_CLW0000001182-83]; JTC Environmental Consultants, 3/27/1985 [CLJA_WATERMODELING_01-0000134144]

[89] Grainger Laboratories, 08/10/1982, pages 1-2 [CLJA_CLW0000000592 - 0593]

Exhibit 3-3. TT-WTP System Data

Sample Date	Concentration (micrograms per liter)				
	PCE	TCE	1,2-DCE	VC	Benzene
5/28/1982	80	NA	NA	NA	NA
7/28/1982	76	NA	NA	NA	NA
	82	NA	NA	NA	NA
	104	NA	NA	NA	NA
2/5/1985	80	8.1	12	NA	NA
	215	8J	12	ND	ND
2/12/1985	ND	ND	ND	ND	ND
2/19/1985	ND	ND	ND	ND	ND
	ND	ND	ND	NA	NA
3/11/1985	ND	ND	ND	ND	ND
	ND	ND	ND	NA	NA
3/12/1985*	8.9J	ND	ND	ND	1.6J
	20	1.1J	1.2J	ND	2.2J
	6.6	ND	ND	NA	NA
	21.3	ND	ND	NA	NA
4/22/1985	1J	ND	ND	ND	ND
4/23/1985	ND	ND	ND	ND	ND
4/29/1985	3.7J	ND	ND	ND	ND
5/15/1985	ND	ND	ND	ND	ND
7/1/1985	ND	ND	ND	ND	ND
7/8/1985	ND	ND	ND	ND	ND
7/15/1985	ND	ND	ND	ND	ND
7/23/1985	ND	ND	ND	ND	ND
7/31/1985	ND	ND	ND	ND	ND
8/13/1985	ND	ND	ND	ND	ND
8/19/1985	ND	ND	ND	NA	NA
9/10/1985	ND	ND	ND	ND	4J

Exhibit 3-3. TT-WTP System Data

Sample Date	Concentration (micrograms per liter)				
	PCE	TCE	1,2-DCE	VC	Benzene
9/16/1985	ND	ND	ND	ND	ND
9/23/1985	ND	ND	ND	ND	ND
10/29/1985	ND	ND	ND	ND	ND
12/2/1985	NA	NA	NA	NA	2J
12/18/1985	NA	NA	NA	NA	1J
1/14/1986	ND	ND	ND	ND	ND
2/5/1986	ND	ND	ND	ND	2J
2/11/1986	ND	ND	ND	ND	ND
2/18/1986	ND	ND	ND	ND	ND
2/26/1986	ND	ND	ND	ND	ND
3/3/1986	ND	ND	ND	ND	ND
3/11/1986	ND	ND	ND	ND	ND
3/25/1986	ND	ND	ND	ND	1J
4/16/1986	ND	ND	ND	ND	4J
4/21/1986	ND	ND	ND	ND	3J
5/5/1986	ND	ND	ND	ND	3J
5/12/1986	ND	ND	ND	ND	3J
5/19/1986	ND	ND	ND	ND	2J
5/27/1986	ND	ND	ND	ND	3J
6/2/1986	ND	ND	ND	ND	ND
6/9/1986	ND	ND	ND	ND	ND
6/16/1986	ND	ND	ND	ND	1J
6/25/1986	ND	ND	ND	ND	4J
7/1/1986	ND	ND	ND	ND	3J
7/9/1986	ND	ND	ND	ND	5J
7/14/1986	ND	ND	ND	ND	1J
7/21/1986	ND	ND	ND	ND	1J

Exhibit 3-3. TT-WTP System Data

Sample Date	Concentration (micrograms per liter)				
	PCE	TCE	1,2-DCE	VC	Benzene
7/28/1986	ND	ND	ND	ND	6J
8/4/1986	ND	ND	ND	ND	5J
12/16/1986	ND	ND	ND	ND	8J

a. *TT-23 on for a period of 24 hours

The contamination originated from the pumping of supply well TT-26. Pumping of well TT-26 was likely not continuous as the well had to be shut down for maintenance and repair. The documentation of shut-down periods for well TT-26 are only sparsely documented between 1980 and 1985, with no information available for the rest of the period of the Act.[90] The average measured concentration for PCE in supply well TT-26 is 656 ug/L (min. 3.8J ug/L; max. 1,580 ug/L). For TCE, 1,2-DCE, and VC, the average concentrations are 17, 16, and 7 ug/L, respectively. Benzene was not detected above trace levels but reported at trace levels below the detection limit. TT-26 was permanently shut down on February 8, 1985.[91]

Well TT-23 was constructed in March 1983. It was reportedly in use on September 29, 1984, when the well was reported to have technical issues (kicking and introducing air into the system).[92] TT-23 was undergoing testing on September 4 and October 14, 1984, indicating that the well was not being used on those dates. TT-23 was shut down on February 8, 1985.[93] The well was again used briefly for 24 hours in March 1985 and three times for 7 hours each in April 1985.[94] The PCE concentration in TT-23 water during the 24-hour period of use in March 1985 averaged approximately 30 ug/L. The contribution of COCs from TT-23 to the water supply was likely not significant on average considering the short period of well use, the relatively low COC concentrations compared to supply well TT-26, and the effect of dilution from blending with water from the non-contaminated supply wells as well as the unavoidable treatment and storage losses.

After February 8, 1985, PCE was not detected in TT-WTP or only reported at low levels. Two sets of samples (upstream and downstream of the blended water reservoir) were taken on March 12, 1985, when TT-23 was being pumped for 24 hours to prevent a water shortage.[95] The results were to quantify the effect of pumping of contaminated well TT-23 on the quality of the

[90] ATSDR (Maslia, Morris L. et al.) July 2007, page A18 [CLJA_WATERMODELING_09-0000615669]

[91] Frazelle, B. M., April 8, 1986 [CLJA_CLW0000001455]

[92] Operational History of Tarawa Terrace supply well TT-23, undated, page 2 [CLJA_WATERMODELING_01-0000489791]

[93] Frazelle, B. M., April 8, 1986 [CLJA_CLW00000001455]

[94] Operational History of Tarawa Terrace supply well TT-23, undated, page 3 [CLJA_WATERMODELING_01-0000489792]

[95] Frazelle, B.M., 3/12/1985 [CLJA_CLW00000001181-82]; JTC Environmental Consultants, 3/27/1985 [CLJA_WATERMODELING_01-0000134144]

raw water reservoir. The results for the raw water reservoir were 20.0 and 21.3 ug/L PCE for the upstream, and 6.6 and 8.9J ug/L for the downstream sample locations. These results are not representative of the average PCE concentration in the raw water after removal of supply well TT-26 since TT-23 was not used outside of the short periods discussed above.

Well TT-25 was constructed in 1982. Fifteen samples were taken and analyzed between January 1985 and August 1986 with no reported detections of COCs above the method detection limits (a single trace concentration of 0.43J ug/L PCE was reported for the sample collected on September 25, 1985). One sample taken after the period of the Act in July 1991 reported the presence of PCE (23 ug/L) and low levels of TCE and 1,2-DCE, which are attributable to the effect of having stopped pumping well TT-26 in February 1985, which allowed migration of dissolved COCs toward well TT-25. TT-25 was likely not contaminated during the period of the Act.

The available data for the TT-WTP system demonstrates that the water supply was not contaminated after February 8, 1985, following supply well TT-26's removal from service.

<u>In summary</u>. The water supply at Tarawa Terrace was likely contaminated with PCE and possibly smaller amounts of TCE and 1,2-DCE over the period that likely started in the 1970s and ended in February 1985 when contaminated-supply-well TT-26 was removed from service. The data demonstrates that thereafter, the water supplied by TT-WTP was not contaminated with chlorinated COCs with the exception of low levels when TT-23 was used for 24 hours, and trace levels in April 1985. As explained further in Opinion 4, TT-WTP occasionally showed trace levels of benzene below the method detection limit. The end of the period of the Act corresponds approximately to the closure of TT-WTP (and Camp Johnson/Montford Point WTP) and the beginning of water supplied to these areas coming from HB-WTP rather than the closure of contaminated supply well TT-26.

Opinion 4. The TT-WTP System Was Likely Not Contaminated with Benzene.

As discussed in Opinion 3 above, the TT-WTP water supply was likely not contaminated with benzene, as this COC was not detected or only reported at trace levels below the method detection limit. The analyses of 47 water samples between February 5, 1985, and December 16, 1986, reported no benzene detection above the method detection limit and only trace levels (flagged "J") to indicate an estimated value below the method detection limit in a portion of the samples. The data for benzene in TT-WTP water samples are included in Exhibit 3-3 under Opinion 3 above.

Opinions for Hadnot Point

Opinion 5. The HP-WTP System Likely Became Contaminated Sometime After Supply Well HP-651 Began Pumping in July 1972.

Supply well HP-651 only supplied water to the HP-WTP from July 1972 until February 5, 1985, when it was removed from service. Well HP-651 was contaminated with chlorinated COCs. Like all water supply wells at Camp Lejeune, it was cycled on and off to avoid drawing low quality water into the water distribution system. A conceptual cross section showing HP-651 and the downgradient source of COC contamination is shown as Exhibit 5-1.

There is available data for COC concentrations in treated water from HP-WTP over the period January 27 to February 5, 1985, when it is known that supply well HP-651 was being pumped.[96] During that period of time, HP-WTP supplied the entirety of the water in the Holcomb Boulevard system which was shut down following a fuel release incident. Eighteen water samples were collected from locations in the two distribution systems. The average TCE concentration in the treated water was 582 ug/L. The available data for the HP-WTP system are summarized in Exhibit 5-2. The data for the period January 27 to February 5, 1985 that contains the data for the period when HP-WTP was providing 100% of the Holcomb Boulevard water supply are summarized in Exhibit 5-3.

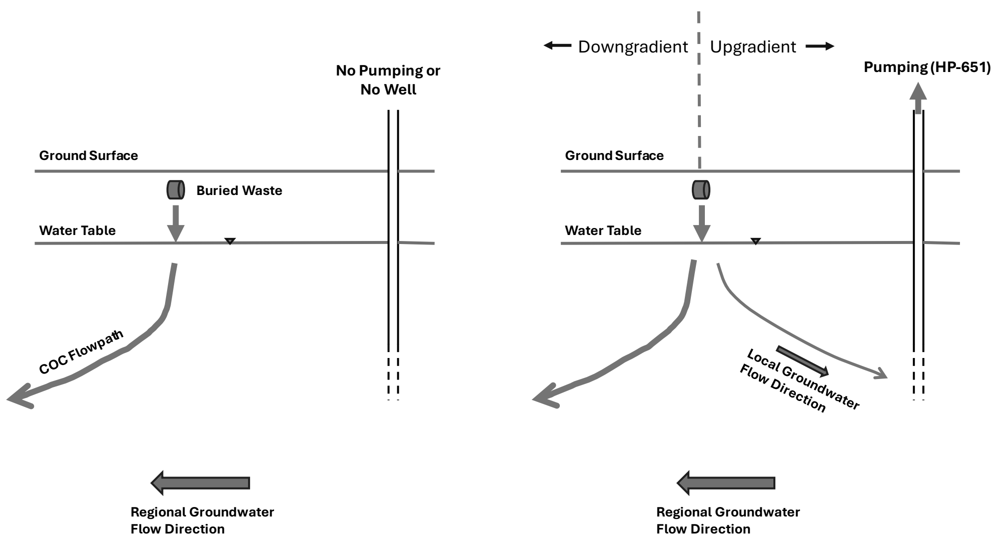

Exhibit 5-1. Supply HP-651 Capturing Downgradient COCs

[96] The handwritten document is for the period November 28, 1984, to February 4, 1985 [CLJA_WATERMODELING_07-0000019001 - 19004]

Exhibit 5-2. COC Concentrations in the HP-WTP System

Sample Date	Concentration (micrograms per liter)				
	PCE	TCE	1,2-DCE	VC	Benzene
5/27/1982	15	1400[a]	NA	NA	NA
7/27/1982	ND	19	NA	NA	NA
7/27/1982	ND	21	NA	NA	NA
7/28/1982	1[b]	NA	NA	NA	NA
12/4/1984	3.9J	200	83	ND	ND
	ND	46	15	ND	ND
12/10/1984	ND	2.3J	2.3J	ND	ND
12/13/1984	ND	ND	ND	ND	ND
12/14/1984	ND	ND	ND	ND	ND
12/15/1984	ND	ND	ND	ND	ND
12/16/1984	ND	ND	ND	ND	ND
12/17/1984	ND	ND	ND	ND	ND
12/18/1984	ND	ND	ND	ND	ND
12/19/1984	ND	ND	ND	ND	ND
	ND	ND	ND	ND	ND
1/31/1985	NA	900	321.3	NA	NA
2/5/1985	7.5J	429	150	2.9J	ND
2/7/1985	NA	16.8	5.3	NA	NA
	NA	ND	ND	NA	NA
	NA	3.4	ND	NA	NA
	NA	ND	ND	NA	NA
4/24/1985	ND	ND	ND	ND	ND
6/18/1985	ND	ND	ND	ND	ND
6/20/1985	ND	ND	ND	ND	ND
6/24/1985	ND	ND	ND	ND	ND
7/1/1985	ND	ND	ND	ND	ND
7/8/1985	ND	ND	ND	ND	ND

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Exhibit 5-2. COC Concentrations in the HP-WTP System

Sample Date	Concentration (micrograms per liter)				
	PCE	TCE	1,2-DCE	VC	Benzene
7/15/1985	ND	ND	ND	ND	ND
7/23/1985	ND	ND	ND	ND	ND
7/31/1985	ND	ND	ND	ND	ND
8/13/1985	ND	ND	ND	ND	ND
9/10/1985	ND	ND	ND	ND	ND
9/16/1985	ND	ND	ND	ND	ND
9/23/1985	ND	ND	ND	ND	ND
10/29/1985	ND	ND	ND	ND	ND
11/19/1985	NA	NA	NA	NA	2500
12/10/1985	NA	NA	NA	NA	38
12/18/1985	NA	NA	NA	NA	1
1/14/1986	ND	ND	ND	ND	ND
2/5/1986	ND	ND	ND	ND	ND
2/11/1986	ND	ND	ND	ND	ND
2/18/1986	ND	ND	ND	ND	ND
2/26/1986	ND	ND	ND	ND	ND
3/3/1986	ND	ND	ND	ND	ND
3/11/1986	ND	ND	ND	ND	ND
3/16/1986	ND	ND	ND	ND	ND
3/25/1986	ND	ND	ND	ND	ND
4/3/1986	ND	ND	ND	ND	ND
4/7/1986	ND	ND	ND	ND	ND
4/16/1986	ND	ND	ND	ND	ND
4/21/1986	ND	ND	ND	ND	ND
5/5/1986	ND	ND	ND	ND	ND
5/12/1986	ND	ND	ND	ND	ND
5/19/1986	ND	ND	ND	ND	ND

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Exhibit 5-2. COC Concentrations in the HP-WTP System

Sample Date	Concentration (micrograms per liter)				
	PCE	TCE	1,2-DCE	VC	Benzene
5/27/1986	ND	ND	ND	ND	ND
6/2/1986	ND	ND	ND	ND	ND
6/9/1986	ND	ND	ND	ND	ND
6/16/1986	ND	ND	ND	ND	ND
6/25/1986	ND	ND	ND	ND	ND
7/1/1986	ND	ND	ND	ND	ND
7/9/1986	ND	ND	ND	ND	ND
7/14/1986	ND	ND	ND	ND	ND
7/21/1986	ND	ND	ND	ND	ND
7/28/1986	ND	ND	ND	ND	ND
8/4/1986	ND	ND	ND	ND	ND
12/16/1986	ND	ND	ND	ND	ND
12/23/1987	ND	0.2	ND	ND	ND
1/11/1988	ND	ND	ND	ND	NA
3/2/1988	NA	ND	NA	ND	ND
5/11/1988	NA	ND	NA	ND	ND
8/11/1988	ND	ND	ND	ND	ND
9/15/1988	NA	ND	NA	ND	ND
5/9/1989	NA	ND	NA	ND	ND
8/8/1989	NA	ND	NA	ND	ND
11/6/1989	NA	0.9	NA	ND	ND
6/26/1990	ND	ND	NA	ND	ND
	ND	ND	NA	ND	ND
2/13/1991	ND	ND	ND	ND	ND
5/20/1991	NA	ND	NA	ND	ND
8/5/1991	NA	ND	NA	ND	ND
11/4/1991	NA	ND	NA	ND	ND

Exhibit 5-2. COC Concentrations in the HP-WTP System

Sample Date	Concentration (micrograms per liter)				
	PCE	TCE	1,2-DCE	VC	Benzene

a. Data reported as unreliable [CLJA_WATERMODELING_01-0000033636; CLJA_CLW0000000564].

b. See CLJA_CLW0000000593 and CLJA_CLW0000005204.

Exhibit 5-3. COC Concentrations in the Holcomb Boulevard and Hadnot Point Systems During Shutdown of HB-WTP: January 27 to February 5, 1985. Supply Well HP-651 Was Shut Down on February 4, 1985.

Sample Location	Sample Date	Sample Time	Concentration (micrograms per liter)	
			TCE	1,2-DCE
2212 Paradise Point	1/29/1985	1:15 PM	1041	NA
Building #670, reservoir	1/29/1985	2:05 PM	8.2	NA
Building #670, upstream of reservoir	1/29/1985	2:20 PM	340	NA
2212 Paradise Point, cold water	1/31/1985	12:35 PM	725	249
2212 Paradise Point, hot water	1/31/1985	12:35 PM	613	201
Tank S-2323	1/31/1985	12:53 PM	407	159
Hydrant near 2204 Paradise Point	1/31/1985	1:00 PM	840	308
2600 Paradise Point	1/31/1985	1:06 PM	891	332
Hydrant near Tank S830	1/31/1985	1:15 PM	849	340
5677 Berkeley Manor	1/31/1985	1:30 PM	981	369
5531 Berkeley Manor	1/31/1985	1:35 PM	906	335
Tank SLCH 4004	1/31/1985	1:49 PM	318	108
Building #670, top of reservoir	1/31/1985	2:00 PM	27	7.6
Building #670, bottom of reservoir	1/31/1985	2:10 PM	24	7.4
Building #670, middle of reservoir	1/31/1985	2:17 PM	26	7.8
Building #20	1/31/1985	2:33 PM	900	321
Building #5400, Berkeley Manor School	1/31/1985	NA	1148	407
Building #20	2/5/1985	NA	429	150

Exhibit 5-3. COC Concentrations in the Holcomb Boulevard and Hadnot Point Systems During Shutdown of HB-WTP: January 27 to February 5, 1985. Supply Well HP-651 Was Shut Down on February 4, 1985.

Sample Location	Sample Date	Sample Time	Concentration (micrograms per liter)	
			TCE	1,2-DCE
Building #20 finished water	2/7/1985	NA	17	5.3
Building #20 filter effluent #1	2/7/1985	NA	ND	ND
Building #20 filter effluent #2	2/7/1985	NA	ND	ND
Building #20 influent	2/7/1985	NA	ND	ND
Building #670 finished water reservoir	2/7/1985	NA	ND	ND
Building #670 filter effluent #1	2/7/1985	NA	ND	ND
Building #670 filter effluent #2	2/7/1985	NA	ND	ND
Building #670 influent	2/7/1985	NA	ND	ND
Hydrant near 2204 Paradise Point	2/7/1985	NA	32	9
Building #5400, Berkeley Manor School	2/7/1985	NA	135	45

On February 7, 1985, a few days after well HP-651 was shut down, 10 samples were collected from locations in the HB- and HP-WTP systems. The analytical results show that TCE was not detected in seven samples and residual concentrations were reported for three samples. The presence of residuals in the water supply system is to be expected as it takes time to purge all contamination out of a water supply system. The data are consistent with the conclusion that TCE contamination was the result of pumping supply well HP-651 and not from the other wells being pumped.

The frequency of use of well HP-651 is documented in a contemporary document by Base personnel over a period of 69 days between November 28, 1984, and February 4, 1985.[97] During that period of time, well HP-651 was pumping water to the HP-WTP 39% of the time (27 days out of 69 days). The frequency of supply wells use over the 69-day period is shown in Exhibit I-9.

Ten samples were collected between December 12 and December 19, 1984, when HP-651 was not being pumped.[98] When HP-651 was not in use, the treated water at HP-WTP was not contaminated. The on and off period for HP-651 and the TCE concentrations in water samples are shown in Exhibit 5-4.

[97] [CLJA_CLW00000006590 - 6593]: The document refers to the period November 28, 1984, to February 4, 1985 [cf. CLJA_WATERMODELING_07-0000019001 - 19004]

[98] *Id.*

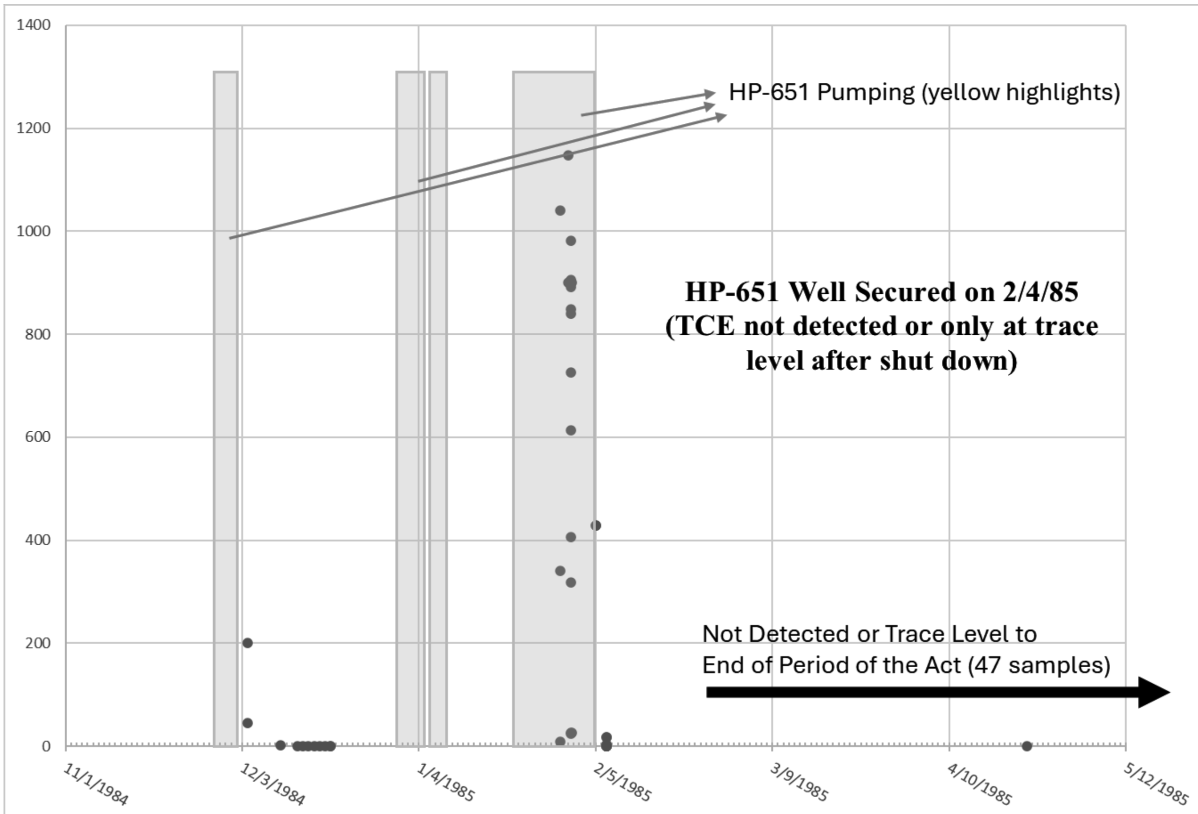

Exhibit 5-4. TCE Concentrations (ug/L) in HP-WTP When Supply Well HP-651 Was Pumping (yellow highlights) and Not Pumping

The average concentration measured for TCE in HP-WTP over the period January 21 to February 5, 1985,[99] is 582 ug/L. During this period it is known that HP-651 was being pumped (Exhibit I-9). Considering that HP-651 was being pumped 39% of the time (0.39 frequency of pumping; Exhibit I-9) yields a TCE long-time average concentration of 227 ug/L for HP-WTP supplied water.

$$0.39 \times 582 \text{ (ug/L)} = 227 \text{ (ug/L)}$$

A check on the validity of the 227 ug/L average TCE concentration can be made using ATSDR's assumption of 28 wells pumping[100] and a 39% frequency of use for the well. This yields a calculated TCE concentration at well HP-651 of approximately 16,297 ug/L in water pumped from HP-651. Adding treatment loss of approximately 17% for TCE (see Opinion 2) would bring the calculated value to approximately 19,635 ug/L, which is consistent with the measured TCE concentration of 18,900 ug/L when supply well HP-651 was pumping in February 1985.

[99] Supply Well HP-651 was shut down on February 4, 1985. The data point for February 5 is included in the average.
[100] ATSDR (Maslia, Morris L. et al.), March 2013, page A14, [CLJA_WATERMODELING_01-0000942616]

$$(227/0.39) \times 28 / 0.83 = 19{,}635$$

PCE and VC were not detected or reported only at trace levels below the method detection limits in HP-WTP water samples, as shown by the data summarized in Exhibit 5-2. The HP-WTP system was contaminated with 1,2-DCE when supply well HP-651 was pumping and was reported at concentrations averaging 220 ug/L (15 samples) during the period January 29, 1985, to February 5, 1985, when the HB-WTP was shut down and the water was supplied entirely by HP-WTP (see Exhibit 5-3).

Other HP-WTP Supply Wells That Contained COCs Were Not Significant Sources of Contaminants in the Water Supply

COC concentrations were analyzed in water samples from the other supply wells.[101] TCE concentrations were reported in wells HP-602, -608, -653, -660, and -634.[102]

- For supply wells HP-602 and HP-608 dilution and treatment losses likely rendered the contribution from these wells to be limited to trace levels in the water supply. Supply well HP-602's average measured TCE concentration over the period of the Act is 411 ug/L (min. not detected; max. 1,600 ug/L; median 320 ug/L)[103] based on analysis of eight samples taken between July 1984 and November 1986. HP-602 was shut down on November 30, 1984. HP-602 was a low-volume pumping well compared to the average of the other wells in the system.[104,105] Well capacity for HP-602 was reported at 150 gpm compared to 200 gpm for well HP-651 and there is a similar average capacity for the other wells in the system. It is unknown when TCE contamination first arrived at HP-602.

  Dilution from blending with water from the other supply wells prior to the construction and use of well HP-651 and treatment losses, were likely sufficient to decrease the TCE concentration contributed by HP-602 to water supply to low or trace levels prior to 1972. Between 1953 and 1972 there were some 28 supply wells (between 28 and 34 wells) being pumped to supply water.[106] Considering HP-602 was a low pumping well and that it was cycled on and off supports this opinion. Using a 39% frequency of use, a 0.75 pumping rate factor to account for the low pumping rate at HP-602 (150 gpm compared to an average of approximately 200 gpm for the supply wells), 31 pumping wells, the average TCE well concentration, and treatment losses at 17%, would yield a trace level TCE concentration in

[101] NAVFAC, (Bailey, J.R.), 04/25/1986 [CLJA_CLW0000004930 - 4931]

[102] Supply well HP-603 reported trace level TCE below the method detection limit in December 1984 and removed from service in May 1985. The well was returned to service and shut down in February 1996 [CLJA_CLW00000005011].

[103] Supply well HP-602 was sampled and analyzed in January 1991 and reported only trace level concentrations below the method detection limit. ATSDR (Faye, Robert E. et al.), October 2010, page C94, [CLJA_WATERMODELING_01-0000033723]

[104] CLJA_CLW00000003544 at CLJA_CLW0000003545-47

[105] Hadnot Point Wells, undated, page 1 [CLJA_CLW0000005019]

[106] ATSDR (Maslia, Morris L., et al.) March 2013, page 14, Figure A6.

the water supply of approximately 3 to 4 ug/L. The contribution would be less using the median of the reported data.

Supply well HP-608's average measured TCE concentration over the period of the Act is 50 ug/L (min. 9J ug/L; max. 110 ug/L) based on the analysis of four samples taken between December 1984 and November 1986. HP-608 was shut down on December 6, 1984. It is unknown when TCE contamination first arrived at HP-608.

Dilution from blending with water from the other supply wells prior to the construction and use of well HP-651 and treatment losses were likely sufficient to decrease the TCE concentration contributed by HP-608 to water supply to low or trace levels prior to 1972. Using the same approach as for HP-602 (without the low pumping rate factor) would yield a trace level TCE concentration in the water supply of less than 1 ug/L.

- Supply well HP-660, with an average measured TCE concentration of 117 ug/L was likely either never used or was only used briefly in the later part of 1984.[107] Contribution from HP-660 was inconsequential over the period of the Act.
- Supply well HP-653 was not contaminated with TCE with data reported as not detected or trace levels below the method detection limit. Contribution from the pumping of this well would therefore not have been significant based on the data.
- Supply well HP-634 was not contaminated with TCE. The well was sampled and analyzed on five occasions. TCE was not detected in two samples taken when the well was pumping (December 4 and December 10, 1984) and in two samples after the well was shut down (November 12, 1986, and January 22, 1991).[108] One sample taken on January 16, 1985, when the well had already been shut down, reported a concentration of 1,300 ug/L for TCE.[109] Results for this particular sample are not reliable and should not be used to represent the water pumped from HP-634 for the following reasons:
    - The sample vials for January 16, 1985, the source of the 1,300 ug/L measurement, were part of a set of vials that were broken during transport;
    - A summary of the data for HP-634 attributes the 1,300 ug/L value to chloroform, not TCE. In that report summary, TCE is attributed a value of 10 ug/L.[110]
    - When HP-634 was in use and pumping, the data show that the well was not contaminated with TCE; and
    - The 1,300 ug/L reported value for TCE is an outlier by comparing with the entirety of the data for HP-634.[111,112]

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[107] Sautner, et al., March 2013, page S1.76 [CLJA_WATERMODELING_05-0000782232]

[108] Faye, et al., October 2010, page C95 [CLJA_WATERMODELING_01-0000033724]

[109] *Ibid.* [CLJA_WATERMODELING_01-0000033724]

[110] CLJA_CLW0000001648 at CLJA_CLW0000001649

[111] Chronology, 02/26/1985 [CLJA_CLW0000004559]

[112] JTC Environmental Consultants, 2/6/1985 [CLJA_CLW0000005608-09]

For these stated reasons the 1,300 ug/L TCE concentration value for HP-634 is anomalous and is not representative of the water pumped from well HP-634.

The drinking water supplied by HP-WTP was not contaminated after February 1985, as demonstrated by the available data which are summarized as Exhibit 5-2.

In summary. The treated water was likely not contaminated or contaminated at trace levels only prior to July 1972 when contaminated well HP-651 was first used.[113] The treated water was not contaminated with TCE after February 1985, as demonstrated by the data. The only available data indicating when HP-651 was or was not pumping is from November 1984 to February 1985. The pumping information suggests an average TCE concentration in the order of 200 ug/L (calculated at 227 ug/L) for finished water at the HP-WTP.

Opinion 6. The HP-WTP System Was Likely Not Contaminated with Benzene.

HP-WTP water was not contaminated with benzene with the exception of a short period limited to November-December 1985 during which benzene was reported in the HP-WTP water.

Benzene in water samples from HP-WTP were only reported above the detection limit in 2 out of 40 samples (11/19/1985 and 12/10/1985) at concentrations of 2,500 and 38 ug/L (a sample collected on 12/18/1985 reported a trace concentration at 1.0J ug/L). These detections were likely not from the supply wells because the only wells found to have benzene contamination had already been shut down by that time. The benzene concentration reported in November-December 1985 was from an analysis that also reported elevated methylene chloride (2,600 ug/L) which was atypical for HP-WTP water and might indicate laboratory cross contamination issues. The results for that sample were noted as "not representative" by Base personnel.[114] The data indicate that the source of benzene, if it were to be real, would have been a one-time short-duration incident most likely from a source other than impacted groundwater. These detections are not representative of benzene concentrations in the supplied water over any extended periods of time. The benzene data are shown in Exhibit 5-2.

Supply well HP-602 was contaminated with benzene at an average concentration of 228 ug/L (min. not detected; max. 720 ug/L; median 175 ug/L).[115] It is unknown when benzene contamination first arrived at well HP-602. As discussed under Opinion 5 above, HP-602 was a low pumping well compared to the average of the other wells in the system.

Dilution from blending with water from the other supply wells and treatment losses were likely sufficient to decrease the benzene concentration contributed by HP-602 to the water supply to trace or not detectable concentration levels. Considering that HP-602 was a low pumping well and that it was cycled on and off supports this opinion. Using a 39% frequency of use, a 0.75 pumping rate factor, 28 pumping wells, the average benzene well concentration, and treatment

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[113] It is likely that HP-651 was not contaminated in the early period of its use as the source of contamination was located downgradient from the well.

[114] 'System: Hadnot Point', undated [CLJA_CLW0000001357]

[115] One sample collected after the period of the Act reported a benzene concentration of 17 ug/L.

losses at about 15% for benzene (see Exhibit 2-4) would yield a trace level benzene concentration in the water supply in the order of 2 ug/L.

$$0.39 \times 0.75 \times (228/28) \times 0.85 = 2.02 \text{ ug/L}$$

In summary. The HP-WTP water supply was likely not contaminated with benzene over the period of the Act. The reported detection of benzene in November-December, 1985, if real, was a short duration incident and does not represent benzene concentration in the water supply over the period of the Act.

Opinions for Holcomb Boulevard

Opinion 7. Supplemental Water from HP-WTP Represented a Small Fraction of the Water in the HB-WTP Distribution Area.

The HB-WTP began operating in 1972 at a design capacity of 1 million gallons per day (mgd) with eight supply wells.[116,117] The wells that supplied water to HB-WTP were not contaminated.[118] The exception is for supply well HB -645 which reported a benzene concentration of 20 ug/L in November 1986. The source of the benzene was reportedly from a leak of fuel at the pump house.[119] The well was sampled in February 1985 and showed no COC detected. The well was removed from service on January 13, 1987.[120] Dilution with water from the other wells would have rendered this short duration benzene contamination nonconsequential for the water supply.

During periods of high water demand[121] that included the irrigation of two golf courses, the water produced at HB-WTP was reportedly not always sufficient to maintain water levels in the water towers and satisfy the demand.[122] When this occurred, the HP-WTP provided supplemental water through a by-pass valve or a booster station that allowed HP-WTP water to supplement HB-WTP.[123]

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[116] CLJA_WATERMODELING_07-0000003181

[117] The plant was upgraded in 1987 when capacity was increased to 5 mgd with 18 supply wells, and HB-WTP began supplying water to the areas of Camp Lejeune that were previously supplied by the Camp Johnson/Monford Point and Tarawa Terrace WTPs [CLJA_WATERMODELING_07_0000003181 and CLJA _WATERMODELING_07_0000003175].

[118] Maslia, et al., March 2013, page A7 [CLJA_WATERMODELING_01-0000942609]

[119] CLJA_WATERMODELING_01-0000207551.

[120] CLJA_WATERMODELING_01-0000206264.

[121] USGS 1989 at CLJA_WATERMODELING_01_0000084713. Highest water demand at the Base is for the months of June and July.

[122] Sautner, et al. March 2013, pages S8.51 - S8.53 [CLJA_WATERMODELING_05-0000784449 - 51]

[123] ATSDR March 2013, Chapter A-Supplement 8 pages S58.52-S8.54.

Such connections between the HP-WTP and HB-WTP systems were limited to a “few to 8-10 hours per day”[124] when activated. The volume of irrigation water required for the two golf courses was reported to be in the order of 48,000 gallons per day.[125] During the period of 1972-1987, this amount of water would have been only about 5% of HB-WTP’s pre-1987 expansion supply capacity of 1 MGD. It has been reported that such interconnections occurred only during the spring and summer months, and not similarly every year.[126] On a yearly basis, the total amount of water from HP-WTP in HB-WTP’s supply would likely have been in the order of 1-2% or less.

In summary. During seasonally dry periods, supplemental water from the HP-WTP represented a very small fraction of the HB-WTP water supply throughout the period of the Act.

Opinion 8. Between January 27 and February 5, 1985, When HB-WTP Was Shut Down, All Water Distributed in the HB-WTP Distribution Area was Supplied by HP-WTP.

An accidental release of fuel into the HB-WTP reservoir led to the total shut down of the HB-WTP system from January 27, 1985, to February 5, 1985. During this approximately nine-day period, the area usually served by the HB-WTP was served by the HP-WTP system. Supply well HP-651 was pumping during this short time, and as a result, the water provided by the HP-WTP to the HB-WTP’s service area was contaminated with PCE, TCE, 1,2-DCE, and VC. The available data for COC concentrations in the Holcomb Boulevard water distribution system during the period of water replacement is summarized in Exhibit 5-3 and discussed under Opinion 7 above.

During the nine days (January 27, 1985 to February 5, 1985) when HB-WTP water was 100% replaced by HP-WTP water, the TCE concentration in the supplied water averaged 582 ug/L and the 1,2-DCE concentration averaged 220 ug/L.

Two days after the HB-WTP resumed operations, on February 7, 1985, water samples of raw water, treated water, and reservoir water were taken at the HB-WTP and the HP-WTP. The samples showed no detected COCs in the raw and treated water. Only one sample of treated water taken from the HP-WTP reported low detections for TCE and 1,2-DCE (17 and 5.3 ug/L, respectively). Because there was no contamination detected in the raw or finished water at the water treatment plant, the results of this sample likely represented residual contaminants in the water distribution system from when HP-651 was pumping. (See Exhibit 5-4).

On February 7, 1985, two water samples were also taken in the Holcomb Boulevard distribution system. One was from a hydrant in Paradise Point and the other from Berkeley Manor Elementary School.[127] TCE was detected at 32 ug/L and 1,2-DCE at 9.0 ug/L in a hydrant sample; and TCE was detected at 135 ug/L and 1,2-DCE at 45 ug/L in a sample at the school. Samples were taken again at these same locations on February 21, 1985, and both samples reported not detected for the COCs.[128] Because of the subsequent non-detections, these contaminants detected in the February 7, 1985, samples most likely represented residuals in the system from the period

[124] ATSDR, 11/14/2008 [CLJA_WATERMODELING_01-0000798724]

[125] ATSDR 2013, Chapter A Supplement 8, pp. S8.51-52

[126] ATSDR 2013, Chapter A Supplement 8, Table S8.20

[127] Bell, M.P., 2/21/1985 [CLJA_WATERMODELING_01-0000179810 - 11]

[128] Betz, Elizabeth A., 3/17/94 [CLJA_CLW0000005308 at CLJA_CLW0000005310]

of January 27, 1985, to February 5, 1985, when contaminated HP-WTP water was supplied to the Holcomb Boulevard distribution system.

In summary. The Holcomb Boulevard water supply was contaminated with water supplied by HP-WTP during the period January 27 to February 5, 1985. Residual concentrations remained for a few days at certain locations until complete flushing of the system was completed.

Opinions on ATSDR Models and Reports

Opinion 9. The ATSDR Model Results Are Biased High as a Result of Conservative Assumptions.

In the absence of data for the drinking water supplies prior to the early 1980s, ATSDR used complex models to estimate monthly historic concentrations for the COCs in the Tarawa Terrace, Hadnot Point, and Holcomb Boulevard WTP systems. ATSDR relied mainly on the data for the water supply wells, which is only available starting in 1984 (see Exhibit I-11). A detailed review of the ATSDR models is presented in Dr. Spiliotopoulos' expert report. ATSDR estimated COC concentrations in the groundwater pumped from the supply wells to the raw water reservoirs prior to treatment, not the water supplied to consumers.

There are numerous reasons why the ATSDR groundwater models led to overestimated and quantitatively unreliable COC concentration values in the Hadnot Point, Tarawa Terrace, and Holcomb Boulevard water supplies.

ATSDR General Assumptions are Deficient

In order to generate COC concentration estimates in the water supplies modeled ATSDR had to make the general assumption that in the absence of COC concentration data in the water supplies prior to 1980, information on supply wells and water treatment plants would be sufficient information to extrapolate quantitatively the COC concentrations measured in the 1980s back to 1953. This assumption is deficient as it implies that there is quantitative and reliable data and information for: a) the timing of COC releases which is not available for the HP-WTP system; b) the duration and intensity of the COC releases which is not available; c) site-specific data to parametrize the modeling of the transport and biodegradation of COCs in the subsurface which is insufficient and mostly lacking for the site; and d) data on actual supply well pumping rates over time and schedule of well pumping for which there is very little reliable data. ATSDR professional judgment and estimates for these unknowns are not verifiable and the ATSDR model results are just a particular rendition of historic estimates for COC concentrations in the water supply of the Base. ATSDR estimates are therefore not quantitatively reliable as different plausible assumptions would lead to different results.

ATSDR assumed that the COC concentrations they estimated for the raw water blended from the pumping of several supply wells are the same as in the water that was distributed to customers by the water treatment plants after storage and treatment which is incorrect. The COC concentrations in raw water are not equivalent to the COC concentrations in the distributed water as discussed under Opinions 2 and 13 in this report.

Tarawa Terrace System – ATSDR's Assumptions that Exaggerate COC Concentrations

ATSDR incorrectly assumed that the releases of PCE at ABC Cleaners started January 1, 1953,[129] which should be end of June 1954, which is 1.5 years later than wrongly assumed (see Expert report of Dr. Brigham). Correcting for the starting date for ABC Cleaners by 1.5 years directly shortens the period of time estimated by ATSDR for PCE in the TT-WTP system.

ATSDR assumed that supply well TT-26 was constantly pumping prior to 1980.[130] This is unlikely as supply wells cannot remain in service for decades without shut down periods for repair and maintenance. The assumption that TT-26 was constantly pumping prior to 1980 exaggerates the ATSDR estimated COC concentrations in the TT-WTP system because TT-26 was the main source of contamination in the TT-WTP distribution area.

Hadnot Point System – ATSDR's Assumptions that Exaggerate COC Concentrations

ATSDR assumed that all sources that contributed COCs to supply wells were from releases that took place a set number of years after installation of solvent or fuel storage tanks, which is unlikely for all sources and likely happened substantially later for at least some sources.[131] As a consequence, ATSDR estimated that water supply wells were contaminated for decades in the absence of data, which is highly conservative, exaggerates the calculated COC concentrations, and is highly uncertain.

ATSDR attributed a concentration of 1,300 ug/L for TCE to the water pumped from well HP-634 which is inconsistent with the available data, as explained under Opinion 5 above. Using a trace or low TCE value for HP-634, as is supported by the data, would substantially decrease the COC concentrations calculated by ATSDR for the raw water.

ATSDR assumed that the re-carbonation basin at HP-WTP was never used, which is unlikely (see Opinion 2). Had the re-carbonation basin been used for a portion of the period of the Act, it would have greatly reduced the COC concentrations in the treated water.

In summary. ATSDR's assumptions are deficient, not verifiable, and at times demonstratively incorrect. ATSDR estimates are not quantitatively reliable as different plausible assumptions would lead to different results. ATSDR COC concentration estimates are for raw water which is not equivalent to COC concentrations in the distributed water.

Opinion 10. The ATSDR Models Did Not Account for the Unavoidable COC Losses During Water Treatment and Distribution.

ATSDR estimates are for the raw water prior to treatment and do not account for the unavoidable evaporative and waste disposal losses of COCs during treatment. The raw water COC

[129] ATSDR relied on a tentative statement by Victor John Melts given more than 40 years after fact: Deposition of Victor John Melts, 4/12/2001 [ATSDR_WATERMODELING_01-0000893182].

[130] ATSDR 2007, Figure A5.

[131] Mass loading: ATSDR Water Modeling Reports for HP - Chapter A, Supplement 6, Table S6.5 and pp. S6.16-17, CLJA_HEALTHEFFECTS-0000221373-74; Mass in Groundwater: ATSDR Water Modeling Reports for HP, Chapter A, Table A6 and p. 59, CLJA_WATERMODELING_05-0000814132.

concentration estimates by ATSDR are therefore not representative of the treated water and exaggerate the COC concentration in the drinking water supply.

ATSDR commissioned a report (AHEC 2004 Final Report) to estimate evaporative losses within the treatment plants. The report concluded that evaporative losses at the head of the spiractors would remove up to 15% of TCE and PCE through evaporative losses alone.[132] ATSDR, with no explanation provided, omitted to include evaporative losses for the water supplied by the WTPs. Ignoring evaporative losses during treatment and storage results in exaggerated COC concentration estimates for the water supplies.

In addition to not accounting for unavoidable evaporative losses, ATSDR did not consider losses of COCs sorbed or attached to the spiractors' spent solids which were periodically disposed of as waste or the filter backflush water that removed the solids trapped by the filters, as described under Opinion 2, above.

Opinion 11. ATSDR Failed to Consider the Available Site Data to Parametrize Their Water Models.

ATSDR did not consider the site-specific data for foc that is available for the aquifer materials through which the dissolved COCs are transported in the groundwater environment. The available foc data over a depth of 10 to 121 feet (ft), which is representative of the groundwater environment into which the dissolved COCs were transported and the supply wells were screened, is summarized on Exhibit 3-2. The foc data is used to quantify a site-specific distribution coefficient Kd, which is one major parameter to calculate the rate of transport of COCs dissolved in groundwater in an aquifer.[133]

$$Kd = foc \times Koc$$

Where foc is the unitless fraction organic carbon measured as Total Organic Carbon on site soils. Koc is the sorption coefficient which is specific to an individual chemical and has been measured in the laboratory and published in the peer-reviewed literature for various types of aquifer materials. Koc values are compound-specific and available from the literature for each COC.[134] Lower Kd values are associated with less retardation and faster contaminant transport in groundwater.

Rather than using the site-specific data to derive relevant Kd values for the COCs in groundwater, ATSDR arbitrarily selected a Kd value for the Tarawa Terrace model, and a generic foc value for the Hadnot Point model. The Kd value for the Tarawa Terrace model is below the reasonable range, and the Kd value for the Hadnot Point model is at the low end of the reasonable range. The importance of reliable foc and Kd values for contaminant transport modeling is

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[132] AH Environmental Consultants, December 2004 [CLJA_WATERMODELING_01-0000071446 - 512]. The AHE report concluded that evaporative losses for TCE and PCE due to aeration at the spiractor effluent pipes were likely to be no larger than 15%. The report calculated 6.1% loss for TCE and 7.7% loss for PCE. Applying the same approach and formulas used in the AHE report for VC yields an evaporative loss of 12.3%.

[133] Freeze and Cherry, 1979.

[134] (Mackay et al., 2006)

addressed in more detail in Dr. Spiliotopoulos' expert report. ATSDR's use of low Kd values had the effect of accelerating arrival of contaminants at the supply wells.

Opinion 12. There Are Unsupported Inconsistencies Between the ATSDR Models.

There are inconsistencies between the Tarawa Terrace and Hadnot Point ATSDR fate and transport models that cannot be justified by the hydrogeology of the aquifer systems beneath the Base.

ATSDR provided no explanation for using very different parameter values for modeling the aquifer beneath Tarawa Terrace and Hadnot Point, in particular for Kd, bulk density, and biodegradation rate values.

Using PCE as the example, for the Tarawa Terrace model ATSDR used a Kd value of 0.14 liters per kilogram (L/kg)[135] and for the Hadnot Point model a Kd value of 0.30 L/Kg. The use of two different Kd values for the same type of aquifer materials cannot be justified. Using a very low Kd value for PCE in the Tarawa Terrace model yields an unrealistic fast travel time for the COCs in the aquifer, therefore biasing high the ATSDR estimated COC concentrations for the earliest portion of the Act.

For the Tarawa Terrace model, ATSDR used an aquifer material bulk density value of 2.7 grams per liter (g/L) compared to a value of 1.65 g/L for Hadnot Point. Again, there is no justification to support this based on the geology and composition of aquifer materials in the subsurface of the Tarawa Terrace and Hadnot Point areas. The bulk density value of 2.7 g/L for the Tarawa Terrace model is unreasonable and inconsistent with the type of aquifer materials beneath the Base.

Even though there is no available data to calculate reliable biodegradation rates for the COCs in the groundwater environment of the Base, ATSDR used rates that are different between the Tarawa Terrace model and the Hadnot Point model. Using PCE as the example, the biodegradation rate used by ATSDR for the Tarawa Terrace model was 0.0005 (d^{-1}) compared to 0.00014 (d^{-1}) for Hadnot Point model, meaning the ATSDR modeled biodegradation of the same contaminants in the aquifer beneath Tarawa Terrace as taking place approximately four times faster than beneath Hadnot Point. Again, there is no data or justification which would support this difference.

<u>In summary</u>. The incorrect starting date for ABC Cleaners and the out-of-range parameters that are inconsistent with site-specific data, or out of reasonable range for the aquifer materials, render the results from the ATSDR Tarawa Terrace model unreliable. Furthermore, the inconsistencies in input parameters (Kd, bulk density, biodegradation rates) used in the two ATSDR groundwater models raise serious doubts on the reliability of the modeling performed. This all adds to the high level of uncertainty that cannot be avoided for modeling long periods of time without any data, as performed by ATSDR.

[135] Faye, February 2008, page F28 [CLJA_WATERMODELING_01-0000093086].

Opinions for Water Buffaloes

Opinion 13. COC Concentrations in the Mobile Field Water Tanks (Water Buffaloes) Were Likely Substantially Lower than in the Water Treatment Plants' Treated Water.

Water buffaloes are mobile tanks for the storage and transportation of drinking water for use in areas of the Base not served by a water supply. Parts and dimensions of a water buffalo are shown in Exhibit 13-1. At the Base, water buffaloes were filled at filling stations.[136] The HP-WTP water was intermittently contaminated as discussed under Opinion 5 (see Exhibit 5-4) above, and I have calculated the percentage of COCs in contaminated water from the HP-WTP that was lost to evaporation during filling. However, this analysis on percentage of lost COCs applies regardless of the location of the filling stations using the COC concentrations in the water supply used to fill the water buffaloes.

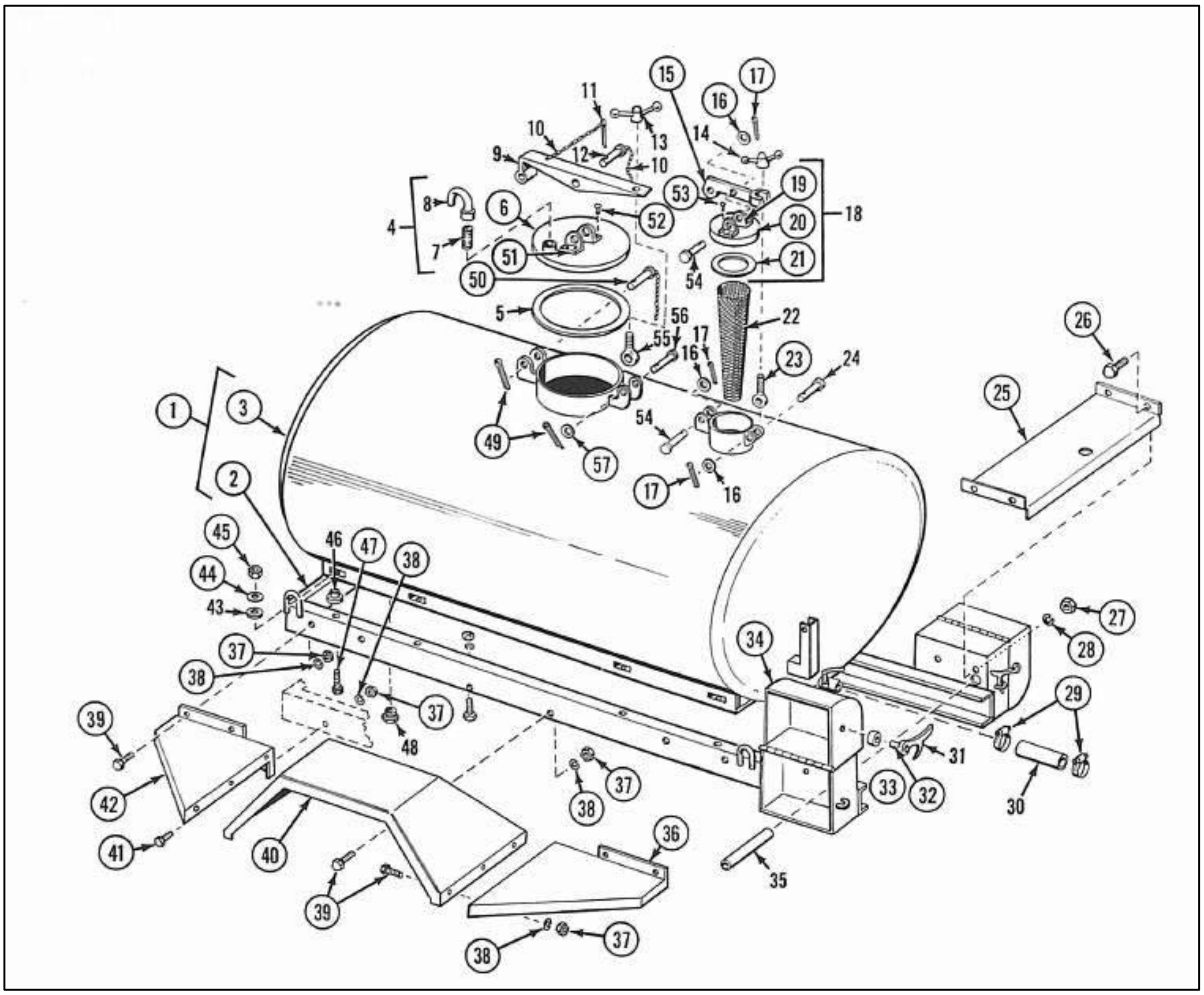

Exhibit 13-1. Diagram of Mobile Water Tank Model M107A2 from TM 9-2330-213-14 (see Attachment C)

[136] Brigham Expert Report at Sec. 7.

During filling of the water buffaloes, a substantial portion of the COCs that might have been dissolved in the water would have been lost by volatilization to the air and thus removed from the water in the tank. Additional COC losses from the water in the buffaloes would have taken place due to temperature changes that forced air exchanges between the atmosphere and the air in the water buffaloes. The COC reductions in the water filled and stored in the water buffaloes can be estimated. The largest COC mass removal from the water is during fill-up of the tank when conditions are ripe for volatilization, through increased contact between water and air due to the forcing of water through a strainer that generates water jets and droplets that greatly increase the surface area of the water/air interface for COC exchange to the tank air. The air containing COCs is expelled from the tank during filling. The filling of the tank through a strainer would involve spraying, splashing, and turbulent flow. These effects would gradually diminish as the strainer becomes submerged in water. Based on published experimental data[137] demonstrating the volatile loss of TCE from a typical household shower, these volatile losses during the filling of the tank can be roughly estimated to be in the order of 40% or more for the COCs. The estimated volatilization losses during filling of the tanks and diurnal temperature effects are summarized in Exhibit 13-2.

As shown in Exhibit 13-1, the filling port on the water tank contained a strainer screen. This screen was approximately 16 inches long, and the tank depth was approximately 32 inches. Treated water flowing into this screen would have experienced enhanced aeration leading to the loss of highly volatile chemicals like TCE. The rate of this volatile loss is a complex process, requiring experimentation when researchers wanted to estimate exposure to TCE during a typical residential shower. A summary by Lawrence Berkeley Laboratory of four experimental studies found TCE loss from the shower water to the air between 58% and 87% of the original water concentration.[138] The experimental results showing 58% volatile loss of TCE with a water temperature of 22 degrees C[139] are used here as a conservative baseline given the unknowns about water droplet formation when water is filled through the strainer. For COCs other than TCE, the overall mass transfer coefficient was calculated and applied to the same experimental conditions as for TCE, yielding volatile loss estimates of up to 81% for VC (see Exhibit 13-2 for estimates for all COCs). These loss rates likely apply during the first half of the tank filling process because the filling strainer extends about halfway down into the tank. For the second half of the filling process, it is assumed that the loss rate declines linearly until the tank is completely full. Considering this decrease in loss rate as the tank fills results in an overall loss rate estimate of about 44% for TCE.

Additional COC losses from the stored water in the water buffaloes are from the diurnal "breathing" of the tank due to temperature changes during day and night. That is, contaminated air in the tank is expelled through venting when temperature rises, causing the tank air to expand.

[137] Little, J.C., 1992. Applying the two-resistance theory to contaminant volatilization in showers. Environmental science & technology, 26(7), pp.1341-1349.

[138] Little, J.C., 1992. Applying the two-resistance theory to contaminant volatilization in showers. Environmental science & technology, 26(7), pp.1341-1349.

[139] McKone, T.E. and Knezovich, J.P., 1991. The transfer of trichloroethyene (TCE) from a shower to indoor air: experimental measurements and their implications. Journal of the Air & Waste Management Association, 41(6), pp.832-837.

Clean atmospheric air enters the tank when temperature drops and when water is consumed. The amount of COC vented out when temperature increases depends on the temperature and the fill level of the tank. For example, if the tank is half full, a daily change of air temperature in the tank from 20 to 30 degrees C would result in the expulsion of approximately 1% of the TCE mass in the water each day.

Exhibit 13-2. Water Buffalo Volatile Loss Calculation

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Henry's Law Constant*	atm*m3 /mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	8.13E-02	8.90E-02	8.64E-02	1.03E-01	9.82E-02
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3 /mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Shower Method:						
Overall mass transfer coefficient (McKone and Knezovich Equation 8)	m/s	3.32E-07	3.56E-07	4.42E-07	4.96E-07	3.71E-07
Mass transfer rate (experimental results for TCE, and for the other chemicals the loss rate was scaled by the ratio of overall mass transfer coefficients for the chemical and TCE)	mg/min	5.14E-01	5.51E-01	6.85E-01	7.67E-01	5.74E-01
Removal (1-Ci/C0)	[-]	54%	58%	72%	81%	60%
Overall Removal (applying the Shower Method removal rate for the first half of tank filling and assuming a linear decrease in removal rate during the second half of tank filling)		41%	44%	54%	61%	45%

a. *Sources: AHEC (2004) for TCE and PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC, DCE, method by Peng and Wang (1997) for benzene.

b. **Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al. 1994a,c for DCE and VC.

References:

c. AH Environmental Consultants Inc. 2004. ATSDR Support - Estimation of VOC Removal, Marine Corps Base Camp Lejeune, North Carolina. December. [CLJA_WATERMODELING_01-0000071446 - 71512].

Exhibit 13-2. Water Buffalo Volatile Loss Calculation

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene

d. Chiao et al. 1994a. Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, 1,1 Dichloroethylene. California DTSC. December.

e. Chiao et al. 1994c. Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, Vinyl Chloride. California DTSC. December.

f. EPA. 2021. Parameter Estimating Tool - Estimated Henry's Law Constants. https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html. Accessed 10/10/2024.

g. McKone, T.E. and Knezovich, J.P., 1991. The transfer of trichloroethyene (TCE) from a shower to indoor air: experimental measurements and their implications. Journal of the Air & Waste Management Association, 41(6), pp.832-837.

h. Peng and Wan. 1997. ES&T. Vol 31. pp. 2998-3003.

i. Thomas. 1990. Volatilization from Water. In: Lyman, W.J. et al., Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

j. Washington, J.W. 1996. Ground Water. Vol. 34. pp. 709-718.

ATSDR estimated concentrations in raw water prior to water treatment, storage, and distribution. ATSDR did not address the treatment and storage losses that are unavoidable during treatment and storage of the water for distribution. Ignoring for the sake of discussion only the shortcomings of the ATSDR models that result in exaggerated and uncertain COC concentrations in the raw water but accounting for the reduction in COCs during water treatment, storage and the filling of a water buffalo, yields substantially lower COC concentrations due to evaporative losses during filling. The COC reductions are in addition to the losses during treatment and storage because the water buffaloes are filled with treated water. The concentration reduction for each COC is shown in Exhibit 13-3 using a generic concentration of 100 ug/L for the raw water.[140] For example, the data indicate that for raw water containing a concentration of 100 ug/L TCE, the water in a water buffalo would be 47 ug/L TCE (overall loss of 53% from the raw water); for VC, the water in the water buffalo would contain only 27 ug/L VC (overall loss of 73% from the raw water). The raw water that contains no COCs would of course not contain any COCs in the water buffalo.

[140] The values shown in Exhibit 13-3 are for evaporative losses during filling of a water buffalo with HP-WTP treated water and do not account for the daily losses due to temperature fluctuations which remove additional COCs from the water stored in a water buffalo.

COC Concentration Reductions During Filling of Water Buffaloes

	PCE	TCE	12-DCE	VC	Benzene
COCs in Raw Water	**100**	**100**	**100**	**100**	**100**
COCs in Treated Water	**82**	**83**	**78**	**68**	**85**
COCs in Water Buffaloes	**48**	**47**	**36**	**27**	**46**
Treatment Losses (see Attachment C)	18.34%	17.07%	22.41%	32.48%	15.12%
Filling Losses (see Attachment C)	41%	44%	54%	61%	45%

Exhibit 13-3. COC Concentration Reductions Between Raw Water and the Water in Water Buffaloes

In summary. A substantial portion of COCs that may have been present in the treated water used to fill a water buffalo would have unavoidably been lost to evaporation during filling, use, and variations of temperature. These COC reductions between the raw water and the water in the water buffaloes would have been in the order of 52% to 73% based on my estimation.

ATTACHMENTS

Attachment A

Curriculum Vitae and List of Depositions and Trial Appearances

Remy J.-C. Hennet, PhD, PG, CPG

Senior Principal, Geochemist and Hydrogeologist

A geochemist and hydrogeologist with more than 30 years of research and professional experience, Dr. Hennet specializes in evaluating the origin, fate, and transport of organic and inorganic chemicals in the environment. Dr. Hennet is often retained as an expert witness for litigation in providing services to industry, law firms, and the U.S. Department of Justice. His areas of expertise include the analysis of geochemical fingerprints for organic and inorganic compounds including radionuclides and stable isotopes, the evaluation of the timing of chemical releases, the allocation of responsibilities for cost allocation, and geochemical modeling. He is a member of the American Academy of Forensic Sciences, the American Chemical Society, the Geological Society of America, and the Association of Groundwater Scientists and Engineers. He was awarded the Woods Hole Oceanographic Institution's Postdoctoral Scholarship in 1987 and has numerous publications in the fields of inorganic and organic geochemistry.

REPRESENTATIVE EXPERIENCE

S.S. Papadopulos & Associates, Inc. *– Rockville, Maryland*

U.S. Department of Justice: Served as an expert witness for several environmental litigation cases. Examples of this work include: the quantification of the history of benzene flux from the subsurface to ambient air following the release of military jet fuel; the evaluation of multi-source petroleum hydrocarbon releases and their individual extent; the evaluation of the impact of bleaching agent when released in a desert environment; the impact and duration of large scale pesticide applications (fumigants, herbicides, and other products); the origin, fate, transport, and timing of the release of chlorinated solvents at several military bases; origins, fate, and transport of persistent chemicals in groundwater.

Atlantic Richfield Company/BP, Montana, California, Nevada: Anaconda tailings ponds site, collected data for a modeling simulation of the fate and transport of dissolved arsenic and cadmium in the alluvium beneath and down-gradient of the ponds. Butte mining district, evaluated the background condition for metals, arsenic, and sulfur chemical species. Montana Pole wood treatment site, evaluated the mobility of arsenic and pentachlorophenol (PCP) in the groundwater environment. Milltown Reservoir on the Clark Fork River; evaluated the background conditions and the mobility of metals and arsenic chemical species in sediments. Evaluation of the design and performance of abatement measures at closed sulfur and copper mines in California and Nevada.

Allocation of Responsibility and Costs (Confidential Clients), nationwide: Reviewed and interpreted large volumes of information to support multi-party allocation models (contaminated river and harbor sediments, landfills, refineries, chemical manufacturing plants).

Rhone Poulenc Corporation, Pennsylvania, California, and New Jersey: Studied arsenic fixation in soil material by various physicochemical treatments as part of a collaborative effort with Pennsylvania State University, with a focus on understanding the processes that control the fixation of arsenic in soils. Advised on the interpretation of data to characterize the mobility of arsenic chemical species at the Bay Road Site in the San Francisco Bay area, and at the Factory Lane Site in New Jersey.

Natural Gas Pipeline Companies, Nationwide: Polychlorinated biphenyls (PCBs) in natural gas pipelines. Fate and transport of PCBs from the historic release of

YEARS OF EXPERIENCE

30+

EDUCATION

- **PhD**, Geochemistry, Princeton University, 1987
- **MA**, Geology, Princeton University, 1983
- **Diplôme**, 3eme Cycle, Hydrogeologie, Université de Neuchatel, Switzerland, 1981
- **Diplôme**, Geologie, Sciences Exactes, Université de Neuchatel, Switzerland, 1980

REGISTRATIONS

- Licensed Professional Geoscientist, Texas No. 425
- Certified Professional Geological Scientist, No. 10572, American Institute of Professional Geologists

EXAMPLE AREAS OF EXPERTISE

- Geochemistry, Hydrogeology, Geology
- Origin, Fate, and Transport of Chemicals in the Environment
- Environmental Forensics
- Cost Allocation
- Litigation Support

AWARDS AND HONORS

- Postdoctoral Scholar, Woods Hole Oceanographic Institution: 1987–1989
- Princeton University Fellowship: 1982–1987
- Swiss National Science Foundation Fellowship at Princeton University: 1981–1982
- Mention Bien, Geologie, Universite de Neuchatel: 1980

Continued on next page

PCB-containing pipeline liquids to pits at several sites along major natural gas pipeline systems.

Envirosafe Services Landfill, Toledo, Ohio: Reviewed detailed organic, inorganic, and isotope data to evaluate the integrity of a large active landfill complex located in an area characterized by historical waste disposal activity.

Lone Pine Site, Freehold, New Jersey: Performed data collection and interpretation to predict chemical composition for the design of a treatment facility.

Heleva Site, Allentown, Pennsylvania: Conducted specialized sampling to assess trace amounts of chlorinated hydrocarbons in acetone-rich groundwater. Acquired isotope and nutrient data to characterize subsurface conditions for natural attenuation and design of the treatment plant.

Love Canal, Niagara Falls, New York, and Stringfellow, Glen Avon, California: Performed detailed data interpretations to assess the validity of expert witness' testimonies related to the fate, behavior, and migration of toxic chemicals in the subsurface.

Tyson Site, Pennsylvania: Conducted a detailed technical investigation of the performance of a large vacuum-extraction system consisting of more than 250 individual extraction wells. The extraction of volatile organic compounds was impeded by subsurface heterogeneities and the presence of residual non-aqueous phase liquids in the subsurface.

Little Mississinewa River Site, Union City, Indiana: Several miles of river sediments were contaminated with waste oil containing elevated PCBs, and PCTs, PAHs, and metals. The main sources of contamination consisted of two major industrial outflows that discharged to the river over a period of several decades. Using chromatograms and raw electronic instrument response data from the analysis of about 200 samples, characterized the chemical fingerprints of both sources and quantified relative contributions.

Coronet Company, Florida: Provided a detailed evaluation of the fate and transport of arsenic, boron, radium, polonium, and other chemicals in soil, ponds sediment, and groundwater at a former phosphate mining and fertilizer processing plant. Conducted geochemical modeling.

White Pine Sash Site, Missoula, Montana: The release of wood treatment product containing pentachlorophenol (PCP) in diesel resulted in contamination of the vadose zone above a major water supply aquifer. Chlorinated-dioxins/furans were also detected in soil samples. Concurrently with the PCP product release(s), diesel/fuel oil No 2 had been released from underground storage tanks in the area. Evaluated and delineated the extent of impact of the diesel/fuel oil No 2 release independently of the PCP-diesel release(s).

CSX Transportation, Florida: Evaluated the origin(s) fate and transport of arsenic in the environment.

Titan Tire Corporation, Iowa: Evaluated the origin of PCB contamination and conducted a detailed review of laboratory data packages.

Uranium Mines and Mine Tailings, New Mexico: Groundwater and surface soil impacts at former uranium mines and mine tailings from the processing of uranium ore.

Septic Releases to Surface Water and Groundwater, nationwide: Sewage and sewage sludge disposal and operation of septic systems affecting groundwater

Continued from previous page

APPOINTMENTS AND COMMITTEES

- 2002 – 2005: Geological Sciences Advisory Board, University of Alabama
- 1996 – 2001: Member of Governing Board, Association of Princeton Graduate Alumni
- 2000: Convenor, THEIS 2000 Conference: Iron in Groundwater, National Ground Water Association
- 1993 – 1999: Technical Advisory Board, Xetex Corporation
- 1989 – 1992: Member of Steering Committee, Working Group 91, Scientific Commission for Oceanic Research

PROFESSIONAL SOCIETIES

- American Academy of Forensic Sciences (AAFS)
- American Chemical Society (ACS)
- American Institute of Professional Geologists (AIPG)
- Geological Society of America (GSA)
- National Ground Water Association (NGWA)

PROFESSIONAL HISTORY

- S.S. Papadopulos & Associates, Inc.: 1989–present
- Woods Hole Oceanographic Institution, Postdoctoral Scholar: 1987–1989
- Princeton University: 1982–1987
  - Research Assistant: 1983–1987
  - Teaching Assistant: 1982–1985
- Université de Neuchatel, Research Assistant: 1980–1981

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and surface water. Evaluation of impacts from nitrogen, phosphorous, and persistent chemicals (pharmaceuticals, fluorinated compounds (PFAS)).

Woods Hole Oceanographic Institution *– Woods Hole, Massachusetts*

Studied the organic and inorganic chemistry of the Guaymas Basin hydrothermal system. Performed detailed trace analyses of metals and petroleum hydrocarbons. The research included the use of the research submarine Alvin for in-situ parameter measurements and sampling. Researched and studied the formation of natural petroleum and the effects of organic molecules degradation and migration on the formation of geopressured zones.

Princeton University *– Princeton, New Jersey*

As Research Assistant, studied metal-organic interaction in natural settings, and served as Senior Thesis Advisor for an experimental study of lead-organic complexing and for an experimental study of trichloroethane in groundwater. Served as Teaching Assistant in Historical Geology and Geomorphology.

Universite de Neuchatel, Centre d'Hydrologie *– Switzerland*

Studied tritium in groundwater and performed related laboratory work. Conducted geochemical fingerprinting in carbonate terrains as applied to the development of water resources.

Publications & Representative Presentations

Andrews, C.B. and R.J-C. Hennet, 2022. *Quest for Groundwater Quality Sustainability – Lessons From 40 Years of Remediation in the United States*. Sustainable Horizons, v. 2, 100009. doi: 10.1016/j.horiz.2022.100009

Bessinger, B. and R.J-C. Hennet, 2019. *Effectiveness of Monitored Natural Attenuation (MNA) as a Groundwater Remedy for Arsenic in Phosphatic Wastes*. Groundwater Monitoring and Remediation, v. 39, no. 4, pp. 52-68. doi: 10.1111/gwmr.12353

Soderberg, K., D.P. McCarthy, and R. J.-C. Hennet, 2015. *Volatilization of Polychlorinated Biphenyls: Implication for their Distribution, Forensics and Toxicity in Urban Environments*. Presentation at the Geological Society of America Annual Meeting, November 1-4, 2015, Baltimore, MD.

Soderberg, K. and R.J.-C. Hennet, 2014. *Detection of Pharmaceuticals in the Environment: History of Use as a Forensic Tool*. in Goldstein, W. ed. Pharmaceutical Accumulation the Environment: Prevention, Control, Health Effects and Economic Impact. CRC Press: Boca Raton, FL. 262 p.

Hennet, R.J.-C, 2010. *PCBs in the Interstate Natural Gas Transmission System – Status and Trends*. White Paper prepared for the Interstate Natural Gas Association of America.

Hennet, R.J.-C, 2010. *Working with Lawyers: The Expert Witness Perspective*. United States Attorneys' Bulletin, v. 58, no. 1, pp. 14-17.

Soderberg, K., and R.J.-C. Hennet, 2007. *Uncertainty and Trend Analysis -- Radium in Groundwater and Drinking Water*. Ground Water Monitoring and Remediation, v. 27, no. 4, pp. 122-127.

Soderberg, K., R. Hennet, and C. Muffels, 2005. *Uncertainty and Trend Analysis for Radium in Groundwater and Drinking Water* (abstract). Presentation at the 2005 National Ground Water Association Conference on Naturally Occurring Contaminants: Arsenic, Radium, Radon, and Uranium, February 24-25, 2005, Charleston, SC. in Abstract Book, pp. 30-44.

Hennet, R.J.-C, 2002. *The Application of Stable Isotope Ratios in Environmental Forensics*. in American Academy of Forensic Sciences Proceedings, pp. 103-104.

Hennet, R.J.-C, 2002. *Life is Simply a Particular State of Organized Instability*. in Fundamentals of Life, G. Palyi *et al*., eds. Paris, France: Elsevier, pp. 109-110.

Hennet, R.J.-C., and L. Chapp, 2001. *Using the Chemical Fingerprint of Pharmaceutical Compounds to Evaluate the Timing and Origin of Releases to the Environment*. in Proceedings of the American Academy of Forensic Sciences, v.4, no. 1, p. 101.

Vlassopoulos, D., C. Andrews, R. Hennet, and S. Macko, 1999. *Natural Immobilization of Arsenic in the Shallow Groundwater of a Tidal Marsh, San Francisco Bay*. Presentation at the American Geophysical Union Spring Meeting, Boston, MA, May 31-June 4, 1999.

Hennet, R.J.-C, D. Carleton, S. Macko, and C. Andrews, 1997. *Environmental Applications of Carbon, Nitrogen, and Sulfur Stable Isotope Data: Case Studies* (abstract). Invited speaker at the Geological Society of America Annual Meeting, Salt Lake City, UT, November.

Jiao, J., C. Zheng, and R. Hennet, 1997. *Analysis of Underpressured Reservoirs for Waste Disposal*. Hydrogeology Journal, v.5, no. 3, pp. 19-31.

Voigt, D.E., S.L. Brantley, R. Hennet, 1996. *Chemical Fixation of Arsenic in Contaminated Soils*. Applied Geochemistry, v. 11, pp. 633-643.

Jiao, J., C. Zheng, and R. Hennet, 1995. *Study of the Feasibility of Liquid Waste Disposal in Underpressured Geological Formations*. Proceedings of the American

Geophysical Union Spring Meeting, Baltimore, MD, May 30–June 2, 1995. in Eos Supplement, v. 76, no. 17, S137.

Vlassopoulos, D., P. Lichtner, W. Guo, and R. Hennet, 1995. *Long-Term Controls on Attenuation of Mine-Waste Related Contamination in Alluvial Aquifers: The Role of Aluminosilicate Clay Minerals*. Proceedings of the American Geophysical Union Spring Meeting, Baltimore, MD, May 30-June 2, 1995. in Eos Supplement, v. 76, no. 17, S150.

Feenstra, S., and R. Hennet, 1993. *Assessment of Performance Limitations on Soil Vapor Extraction (SVE) in Variable Soils*. The Newsletter of the Association of Ground Water Scientists and Engineers, v. 9, no. 3, pp. 112-113.

Hennet, R.J.-C., and S. Feenstra, 1993. *Assessment of Performance Limitations on Soil Vapor Extraction (SVE) in Variable Soils* (abstract). Presentation at the Symposium on Chlorinated Volatile Organic Compounds in Ground Water, National Ground Water Association 45th Annual Convention, Kansas City, MO, October 17-20, 1993. in Ground Water, v. 31, no. 5, pp. 828-829.

Hennet, R.J.-C., and C. Andrews, 1993. *PCB Congeners as Tracers for Colloid Transport in the Subsurface—A Conceptual Approach*. in Manipulation of Groundwater Colloids for Environmental Restoration. Ann Arbor, MI: Lewis Publishers, pp. 241-246.

Hennet, R.J.-C, 1992. *Abiotic Synthesis of Amino Acid Under Hydrothermal Conditions and the Origin of Life: A Perpetual Phenomenon?* Invited speaker at the Gordon Research Conference on Organic Geochemistry, New Hampshire.

Hennet, R.J.-C, N. Holm, and M. Engel, 1992. *Abiotic Synthesis of Amino Acid Under Hydrothermal Conditions and the Origin of Life: A Perpetual Phenomenon?* Naturwissenschaften, v. 79, pp. 361-365.

Hennet, R.J.-C, and N. Holm, 1992. *Hydrothermal Systems: Their Varieties, Dynamics, and Suitability for Prebiotic Chemistry*. in Origins of Life and Evolution of the Biosphere, Netherlands, v. 22, pp. 15-31.

Holm, N., A. Cairns-Smith, R. Daniel, J. Ferris, R. Hennet, E. Shock, B. Simoneit, and H. Yanagawa, 1992. *Future Research*. in Origins of Life and Evolution of the Biosphere, v. 22, pp. 181-190.

Hunt, J.M., and R. Hennet, 1992. *Modeling Petroleum Generation in Sedimentary Basins*. in Productivity, Accumulation, and Preservation of Organic Matter Recent and Ancient Sediments. J. Whelan and J. Farrington, eds. New York: Columbia University Press, pp. 20-52.

Hunt, J.M., M. Lewan, and R. Hennet, 1991. *Modeling Oil Generation with Time-Temperature Index Graphs Based on the Arrhenius Equation*. AAPG Bulletin, v. 75, no. 4, pp. 795-807.

Hennet, R.J.-C, D. Crerar, and J. Schwartz, 1988. *The Effect of Carbon Dioxide Partial Pressure on Metal Transport in Low-Temperature Hydrothermal Systems*. Chemical Geology, v. 69, pp. 321-330.

Hennet, R.J.-C, D. Crerar, and J. Schwartz, 1988. *Organic Complexes in Hydrothermal Systems*: Economic Geology, v. 83, pp. 742-767.

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Hennet, R.J.-C, and J.K. Whelan, 1988. *In-Situ Chemical Sensors for Detecting and Exploring Ocean Floor Hydrothermal Vents*. Woods Hole Oceanographic Institution Technical Report WHOI-88-53, p. 69.

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Hennet, R.J.-C, D. Crerar, E. Brown, and J. Schwartz, 1986. *Transport of Base Metals in Hydrothermal Brines by Organic and Possible Thiocarbonate Complexes: The Genesis of Stratiform Sediment-Hosted Lead and Zinc Deposits*. Conference Proceedings. in Geological Science, Stanford University, v. 20, pp. 197-198.

Hennet, R.J.-C, 1985. *Partial Pressure of Carbon Dioxide and Base Metal Solubility: A Model for the Genesis of Hydrothermal Ore Deposits*. Poster presentation at the Gordon Research Conference on Inorganic Geochemistry of Hydrothermal Deposits, New Hampshire.

Hennet, R.J.-C, D. Crerar, and E. Brown, 1985. *Base Metal Transport by Organic Complexing in Ore-Forming Brines* (abstract). in Proceedings of the Second International Symposium on Hydrothermal Reactions. The Pennsylvania State University, p. 43.

Hennet, R.J.-C, D. Crerar, and J. Schwartz, 1985. *Metal-Organic Complexes in Ore-Forming Brines*. Presentation at the190th National Meeting of the American Chemical Society, Division of Environmental Chemistry, Chicago, IL, September 9, 1985.

Hennet, R.J.-C, 1983. *Formation Constants of Lead and Zinc Metal-Organic Complexes Using Polarography (ASV, DPP), Specific Ion Electrodes (ISE), and Nuclear Magnetic*

Resonance Spectroscopy (NMR). Unpublished MA thesis, Princeton University.

Hennet, R.J.-C, D. Crerar, J. Schwartz, and T. Giordano, 1983. *New Ligand-Bond Mechanisms for the Transport of Zinc in the Genesis of Mississippi Valley-Type Ore Deposits*. Eos, v. 64, no. 45, p. 885.

Flury, F.R., R. Hennet, and A. Matthys, 1981. *Developpement des resources en eaux de la Ville de Delemont* (Jura, Suisse). Unpublished Diplome d'Hydrogeologie. Centre d'Hydrogeologie. Universite de Neuchatel, Switzerland.

Hennet, R.J.-C, 1980. *Cartographie de la Region Neuchatel-Valangin: Etude de la Mineralogie par Diffraction-X, de la Stratigraphie et des Microfacies du Valanginien*. Discussion de Stratotype de Valangin. Unpublished Diplome de Geologie. University de Neuchatel, Switzerland.

Deposition Experience

DEPOSITIONS – 2020 TO PRESENT

- 2024 – *Metro Container Group v. AC&T, Co., Inc., et al*. United States District Court for the Eastern District of Pennsylvania. Case No. 2:18-CV-03623-GEKP. May 15.
- 2023 – *Honeywell International Inc. v. R.R. Donnelley & Sons Company v. Tract II Betterment*. United States District Court Western District of New York. Case No. 1:16-CV-00969SK(F). March 7.
- 2022 – *Hecla Limited et al v. The Travelers Indemnity Company et al*. Eleventh Judicial District Court for the County of McKinley, State of New Mexico. Case No. D-1113-CV-2018-00086. September 20.

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Attachment C

Relevant Properties of the COCs and Evaporative Loss Calculations

C-1

Results

Table for COC Evaporative Losses at an Effluent Spiractor Pipe and Other Structures

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Henry's Law Constant*	atm*m3/mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	8.13E-02	8.90E-02	8.64E-02	1.03E-01	9.82E-02
Rearation coefficient ratio (Thomas Table 15-2)***	[-]	0.52	0.57	0.77	0.86	0.57
Oxygen rearation coefficient (Thomas Table 15-3)	1/h	0.008	0.008	0.008	0.008	0.008
Volatilization coefficient (Thomas Equation 15-22)	1/h	0.0028	0.0033	0.0052	0.0062	0.0033
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3/mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Spiractor Variables						
Pipe Diameter	m	0.3	0.3	0.3	0.3	0.3
Pipe Circumference	m	0.94	0.94	0.94	0.94	0.94
Critical Depth above Weir	m	0.05	0.05	0.05	0.05	0.05
Fall Height Z (60 cm + 1.5x5cm critical depth)	m	0.675	0.675	0.675	0.675	0.675
Tailwater Depth h	m	0.15	0.15	0.15	0.15	0.15
Flow Rate	m3/h	157.73	157.73	157.73	157.73	157.73
Flow Rate per Length of Weir q	m2/h	167.79	167.79	167.79	167.79	167.79
Deficit Ratio ln(r) (AHEC Equation 11, corrected)	[-]	0.2334	0.2334	0.2334	0.2334	0.2334
Liquid Mass Transfer Coefficient k_l (AHEC Equation 10)	m/s	0.0144	0.0154	0.0192	0.0214	0.0161
Gas Mass Transfer Coefficient k_g (AHEC Equation 9)	m/s	0.0441	0.0469	0.0459	0.0515	0.0500
Overall Mass Transfer Coefficient K_0 (AHEC Equation 8)	m/s	9.01E-03	7.28E-03	8.15E-03	1.46E-02	5.80E-03
Fraction Remaining (Ci/C0) (AHEC Equation 7)	[-]	0.8777	0.8999	0.8887	0.8089	0.9194
Removal (1-Ci/C0)	[-]	**12.23%**	**10.01%**	**11.13%**	**19.11%**	**8.06%**
Finished Reservoir						
Residence time (2.5 million gallons total, 5 MGD flow)	h	12	12	12	12	12
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9668	0.9617	0.9390	0.9279	0.9617
Removal (1-Ci/C0)	[-]	**3.32%**	**3.83%**	**6.10%**	**7.21%**	**3.83%**
Water Tower						
Residence time (300,000 gal tank, 1.25 MGD flow)	h	5.76	5.76	5.76	5.76	5.76
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9839	0.9814	0.9703	0.9647	0.9814
Removal (1-Ci/C0)	[-]	**1.61%**	**1.86%**	**2.97%**	**3.53%**	**1.86%**
Raw Water Reservoir						
Residence time (800,000 gal tank, 5 MGD flow)	h	3.84	3.84	3.84	3.84	3.84
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9893	0.9876	0.9801	0.9763	0.9876
Removal (1-Ci/C0)	[-]	**1.07%**	**1.24%**	**1.99%**	**2.37%**	**1.24%**
Re-carbonation Basin Without Bubbling of CO2 (Flow Through Basin)						
Residence time (AHEC, 2004)	h	0.08	0.08	0.08	0.08	0.08
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9998	0.9997	0.9996	0.9995	0.9997
Removal (1-Ci/C0)	[-]	**0.02%**	**0.03%**	**0.04%**	**0.05%**	**0.03%**
Sand Filter:						
Residence time (AHEC, 2004)	h	0.33	0.33	0.33	0.33	0.33
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9991	0.9989	0.9983	0.9979	0.9989
Removal (1-Ci/C0)	[-]	**0.09%**	**0.11%**	**0.17%**	**0.21%**	**0.11%**
Overall Removal by Volatilization		**18.34%**	**17.07%**	**22.41%**	**32.48%**	**15.12%**

*Sources: AHEC (2004) for TCE and PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC and DCE, method by Peng and Wang (1997) for benzene.

**Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al., 1994a,c for DCE and VC.

***Values for VC and 1,2-tDCE are interpolated based on the ratio of diffusion coefficient in water to that of oxygen at 20 degrees C (1.76x10^-5 cm2/s) from Han and Bartels (1996).

References:

AH Environmental Consultants Inc. 2004. ATSDR Support - Estimation of VOC Removal, Marine Corps Base Camp Lejeune, North Carolina. December. [CLJA_WATERMODELING_01-0000071446 - 71512].

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Thomas. 1990. Volatilization from Water. In: Lyman, W.J. et al., Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

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Table for COC Evaporative Losses at an Effluent Spiractor Pipe and Other Structures at the Tarawa Terrace Water Treatment Plant

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Henry's Law Constant*	atm*m3/mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	8.13E-02	8.90E-02	8.64E-02	1.03E-01	9.82E-02
Rearation coefficient ratio (Thomas Table 15-2)***	[-]	0.52	0.57	0.77	0.86	0.57
Oxygen rearation coefficient (Thomas Table 15-3)	1/h	0.008	0.008	0.008	0.008	0.008
Volatilization coefficient (Thomas Equation 15-22)	1/h	0.0028	0.0033	0.0052	0.0062	0.0033
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3/mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Spiractor Variables						
Pipe Diameter	m	0.3	0.3	0.3	0.3	0.3
Pipe Circumference	m	0.94	0.94	0.94	0.94	0.94
Critical Depth above Weir	m	0.05	0.05	0.05	0.05	0.05
Fall Height Z (60 cm + 1.5x5cm critical depth)	m	0.675	0.675	0.675	0.675	0.675
Tailwater Depth h	m	0.15	0.15	0.15	0.15	0.15
Flow Rate	m3/h	157.73	157.73	157.73	157.73	157.73
Flow Rate per Length of Weir q	m2/h	167.79	167.79	167.79	167.79	167.79
Deficit Ratio ln(r) (AHEC Equation 11, corrected)	[-]	0.2334	0.2334	0.2334	0.2334	0.2334
Liquid Mass Transfer Coefficient k_l (AHEC Equation 10)	m/s	0.0144	0.0154	0.0192	0.0214	0.0161
Gas Mass Transfer Coefficient k_g (AHEC Equation 9)	m/s	0.0441	0.0469	0.0459	0.0515	0.0500
Overall Mass Transfer Coefficient K_0 (AHEC Equation 8)	m/s	9.01E-03	7.28E-03	8.15E-03	1.46E-02	5.80E-03
Fraction Remaining (Ci/C0) (AHEC Equation 7)	[-]	0.8777	0.8999	0.8887	0.8089	0.9194
Removal (1-Ci/C0)	[-]	**12.23%**	**10.01%**	**11.13%**	**19.11%**	**8.06%**
Finished Reservoir						
Residence time (0.75 million gallons, 1 MGD flow)	h	18	18	18	18	18
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9507	0.9431	0.9100	0.8938	0.9431
Removal (1-Ci/C0)	[-]	**4.93%**	**5.69%**	**9.00%**	**10.62%**	**5.69%**
Water Tower						
Residence time (250,000 gal tank, 1 MGD flow)	h	6	6	6	6	6
Fraction Remaining (Ci/C0) (Thomas Equation 15-12)	[-]	0.9833	0.9807	0.9690	0.9633	0.9807
Removal (1-Ci/C0)	[-]	**1.67%**	**1.93%**	**3.10%**	**3.67%**	**1.93%**
Overall Removal by Volatilization		**18.84%**	**17.63%**	**23.23%**	**33.41%**	**15.68%**

*Sources: AHEC (2004) for TCE, PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC, DCE, method by Peng and Wang (1997) for benzene.
**Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al. 1994a,c for DCE, VC.
***Values for VC and 1,2-tDCE are interpolated based on the ratio of diffusion coefficient in water to that of oxygen at 20 degrees C (1.76x10^-5 cm2/s) from Han and Bartels (1996).

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AH Environmental Consultants Inc. 2004. ATSDR Support - Estimation of VOC Removal, Marine Corps Base Camp Lejeune, North Carolina. December. [CLJA_WATERMODELING_01-0000071446 - 71512].

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Table for COC Evaporative Losses during Filling of a Water Buffalo

Variable	Units	PCE	TCE	1,2-tDCE	VC	Benzene
Henry's Law Constant*	atm*m3/mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	8.13E-02	8.90E-02	8.64E-02	1.03E-01	9.82E-02
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3/mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Shower Method:						
Overall mass transfer coefficient (McKone and Knezovich Equation 8)	m/s	3.32E-07	3.56E-07	4.42E-07	4.96E-07	3.71E-07
Mass transfer rate (experimental results for TCE (McKone and Knezovich 1991), and for the other chemicals the loss rate was scaled by the ratio of overall mass transfer coefficients for the chemical and TCE)	mg/min	5.14E-01	5.51E-01	6.85E-01	7.67E-01	5.74E-01
Removal (1-Ci/C0)	[-]	**54%**	**58%**	**72%**	**81%**	**60%**
Overall Removal by Volatilization (applying the Shower Method removal rate for the first half of tank filling and assuming a linear decrease in removal rate during the second half of tank filling)		**41%**	**44%**	**54%**	**61%**	**45%**

*Sources: AHEC (2004) for TCE and PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC, DCE, method by Peng and Wang (1997) for benzene.

**Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al. 1994a,c for DCE and VC.

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Washington, J.W. 1996. Ground Water. Vol. 34. pp. 709-718.

C-2

Supporting Materials

Table of Chemical Properties				
Compound	**Property**	**Value**	**Units**	**Source**
Oxygen	Diffusion coefficient in water	1.76E-05	cm2/s	Calculated at 20 degrees C using Han, P. and Bartels, D.M., 1996. Temperature dependence of oxygen diffusion in H 2 O and D 2 O. The Journal of physical chemistry, 100(13), pp.5597-5602.
PCE	Diffusion coefficient in water	7.59E-06	cm2/s	AHEC (2004) Table 3-1
TCE	Diffusion coefficient in water	8.43E-06	cm2/s	AHEC (2004) Table 3-1
1,2-tDCE	Diffusion coefficient in water	1.17E-05	cm2/s	Chiao et al (1994) DCE
VC	Diffusion coefficient in water	1.38E-05	cm2/s	Chiao et al (1994) VC
Benzene	Diffusion coefficient in water	8.99E-06	cm2/s	AHEC (2004) Appendix C
PCE	Diffusion Coefficient in Air	8.13E-02	cm2/s	AHEC (2004) Table 3-1
TCE	Diffusion Coefficient in Air	8.90E-02	cm2/s	AHEC (2004) Table 3-1
1,2-tDCE	Diffusion Coefficient in Air	8.64E-02	cm2/s	Chiao et al (1994) DCE
VC	Diffusion Coefficient in Air	1.03E-01	cm2/s	Chiao et al (1994) VC
Benzene	Diffusion Coefficient in Air	9.82E-02	cm2/s	AHEC (2004) Appendix C
PCE	Henry's Law Constant	1.31E-02	atm*m3/mol	AHEC (2004) Table 3-1
TCE	Henry's Law Constant	7.07E-03	atm*m3/mol	AHEC (2004) Table 3-1
1,2-tDCE	Henry's Law Constant	7.42E-03	atm*m3/mol	Calculated at 20 degrees C using the EPA Online Tool, method by Washington (1996); "Value calculated using thermodynamic data reported in Washington, J.W. 1996. Ground Water. Vol. 34. pp. 709-718." https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html
VC	Henry's Law Constant	2.17E-02	atm*m3/mol	Calculated at 20 degrees C using the EPA Online Tool, method by Washington (1996); "Value calculated using thermodynamic data reported in Washington, J.W. 1996. Ground Water. Vol. 34. pp. 709-718." https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html
Benzene	Henry's Law Constant	4.36E-03	atm*m3/mol	Calculated at 20 degrees C using the EPA Online Tool, method by Peng and Wan (1997); "Data from Peng and Wan, 1997, ES&T 31, 2998-3003." https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html
PCE	Rearation coefficient ratio (kvc/kvo)	0.52	unitless	Thomas (1990) Table 15-2
TCE	Rearation coefficient ratio (kvc/kvo)	0.57	unitless	Thomas (1990) Table 15-2
1,2-tDCE	Rearation coefficient ratio (kvc/kvo)	0.77	unitless	Calculated based on a regression of [kvc/kvo] vs [Dc/Do] from values for other volatile compounds in Thomas (1990) Table 15-2 (see separate tab in this workbook)
VC	Rearation coefficient ratio (kvc/kvo)	0.86	unitless	Calculated based on a regression of [kvc/kvo] vs [Dc/Do] from values for other volatile compounds in Thomas (1990) Table 15-2 (see separate tab in this workbook)
Benzene	Rearation coefficient ratio (kvc/kvo)	0.57	unitless	Thomas (1990) Table 15-2

References:

AH Environmental Consultants Inc. 2004. ATSDR Support - Estimation of VOC Removal, Marine Corps Base Camp Lejeune, North Carolina. December. [CLJA_WATERMODELING_01-0000071446 - 71512].

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Chiao et al. 1994c. Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, Vinyl Chloride. California DTSC. December.

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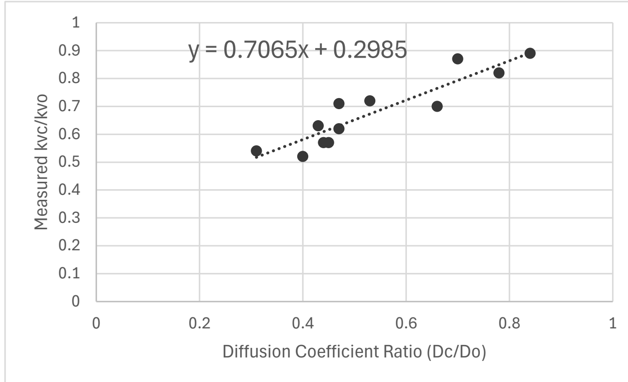
Washington, J.W. 1996. Ground Water. Vol. 34. pp. 709-718.

Regression of Measured Reaeration Coefficient Ratios to Diffusion Coefficient Ratios

Thomas (1990), Table 15-2, Measured reaeration coefficient ratios (kvc/kvo) for high-volatility compounds)

Compound	Diffusion Coefficient Ratio (Dc/Do)	Measured kvc/kvo
Chloroform	0.47	0.62
1,1-Dichlorothane	0.47	0.71
Benzene	0.45	0.57
Carbon Dioxide	0.84	0.89
Carbon tetrachloride	0.43	0.63
Dicyclopentadiene	0.31	0.54
Ethylene	0.7	0.87
Krypton	0.78	0.82
Propane	0.53	0.72
Radon	0.66	0.7
Tetrachloroethylene	0.4	0.52
Trichloroethylene	0.44	0.57



From regression: [kvc/kvo] = 0.7065*[Dc/Do] + 0.2985

slope 0.7065

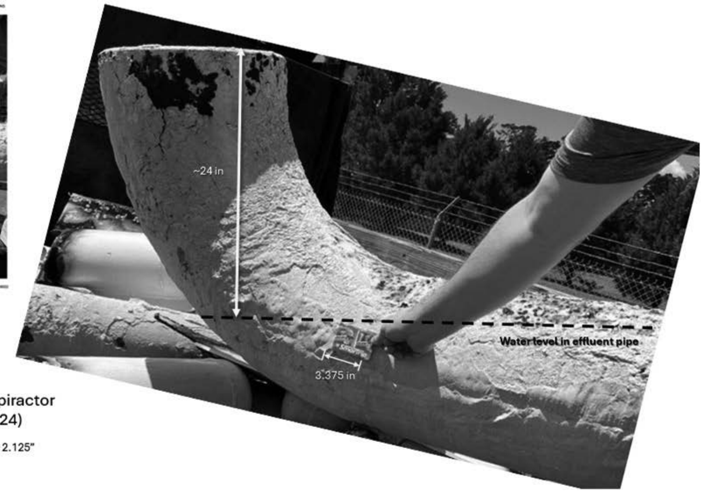
intercept 0.2985

Reference:

Thomas. 1990. Volatilization from Water. In: Lyman, W.J. et al., Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

Estimated Volatile Losses in the Spiractor Effluent Pipe Using the Weir Method of Nakasone 1987

Variable	Units	PCE	TCE	trans12DCE	VC	Benzene
Henry's Law Constant*	atm*m3/mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	0.0813	0.089	8.64E-02	1.03E-01	0.0982
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3/mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Geometry						
Pipe Diameter	m	0.3	0.3	0.3	0.3	0.3
Pipe Circumference	m	0.94	0.94	0.94	0.94	0.94
Critical Depth above Weir	m	0.05	0.05	0.05	0.05	0.05
Fall Height Z (60 cm + 1.5x5cm critical depth)	m	0.675	0.675	0.675	0.675	0.675
Tailwater Depth h	m	0.15	0.15	0.15	0.15	0.15
Hydraulics						
Flow Rate	m3/h	157.73	157.73	157.73	157.73	157.73
Flow Rate per Length of Weir q	m2/h	167.79	167.79	167.79	167.79	167.79
Calculations:						
Deficit Ratio ln(r) (AHEC Equation 11 corrected)	[-]	0.2334	0.2334	0.2334	0.2334	0.2334
Liquid Mass Transfer Coefficient k_l (AHEC Equation 10)	m/s	0.0144	0.0154	0.0192	0.0214	0.0161
Gas Mass Transfer Coefficient k_g (AHEC Equation 9)	m/s	0.0441	0.0469	0.0459	0.0515	0.0500
Overall Mass Transfer Coefficient K_0 (AHEC Equation 8)	m/s	9.01E-03	7.28E-03	8.15E-03	1.46E-02	5.80E-03
Fraction Remaining (Ci/C0) (AHEC Equation 7)	[-]	0.8777	0.8999	0.8887	0.8089	0.9194
Removal (1-Ci/C0)	[-]	**12.23%**	**10.01%**	**11.13%**	**19.11%**	**8.06%**



Site visit photograph of spiractor effluent pipe (May 23, 2024)

DC Metro card dimensions: 3.375" by 2.125"

*Sources: AHEC (2004) for TCE and PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC and DCE, method by Peng and Wang (1997) for benzene.

**Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al. 1994a,c for DCE, VC.

***Values for VC and 1,2-tDCE are interpolated based on the ratio of diffusion coefficient in water to that of oxygen at 20 degrees C (1.76x10^-5 cm2/s) from Han and Bartels (1996).

References:

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Estimated Volatile Losses in the Finished Reservoirs at Hadnot Point Using the Smith Method for Highly Volatile Compounds as Presented by Thomas (1990), pages 15-17 to 15-21

Parameter	Units	PCE	TCE	12-tDCE	VC	Benzene
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Lab Measured k_v_c/k_v_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.52	0.57	0.47	0.56	0.57
Diffusion Coefficient Ratio D_c/D_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.4	0.44	0.66	0.79	0.45
Overall oxygen liquid phase exchange coeff. k_v_o (Thomas Table 15-3) using the lowest of the calculated values	1/h	0.008	0.008	0.008	0.008	0.008
Overall chemical liquid phase exchange coeff. k_v_c (Thomas Eq 15-22)	1/h	0.0028	0.0033	0.0024	0.0031	0.0033
Fraction Remaining (Ci/C0) (Thomas Eq 15-11)	[-]	96.68%	96.17%	97.18%	96.30%	96.17%
Removal (1-Ci/C0)	**[-]**	**3.32%**	**3.83%**	**2.82%**	**3.70%**	**3.83%**

Constants

1.76013E-05	Oxygen diffusion coefficient		
Retention time (h)	Reservoir Volume		Flow Rate (plant capacity)
12	2500000 gal		5000000 gpd

CLJA_WATERMODELING_07-0000003169

Estimated Volatile Losses in the Finished Reservoirs at Hadnot Point Using the Smith Method for Highly Volatile Compounds as Presented by Thomas (1990), pages 15-17 to 15-21

Parameter	Units	PCE	TCE	12-tDCE	VC	Benzene
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Lab Measured k_v_c/k_v_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.52	0.57	0.47	0.56	0.57
Diffusion Coefficient Ratio D_c/D_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.4	0.44	0.66	0.79	0.45
Overall oxygen liquid phase exchange coeff. k_v_o (Thomas Table 15-3) using the lowest of the calculated values	1/h	0.008	0.008	0.008	0.008	0.008
Overall chemical liquid phase exchange coeff. k_v_c (Thomas Eq 15-22)	1/h	0.0028	0.0033	0.0024	0.0031	0.0033
Fraction Remaining (Ci/C0) (Thomas Eq 15-11)	[-]	98.39%	98.14%	98.64%	98.21%	98.14%
Removal (1-Ci/C0)	**[-]**	**1.61%**	**1.86%**	**1.36%**	**1.79%**	**1.86%**

Constants			
1.76013E-05	Oxygen diffusion coefficient		
Retention time (h)	Water Tower Volume	Flow Rate (plant capacity per water tower)	
5.76	300000 gal	1250000	gpd

CLJA_WATERMODELING_07-0000003169

Estimated Volatile Losses in the Raw Water Reservoir at Hadnot Point Using the Smith Method for Highly Volatile Compounds as Presented by Thomas (1990), pages 15-17 to 15-21

Parameter	Units	PCE	TCE	12-tDCE	VC	Benzene
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Lab Measured k_v_c/k_v_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.52	0.57	0.47	0.56	0.57
Diffusion Coefficient Ratio D_c/D_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.4	0.44	0.66	0.79	0.45
Overall oxygen liquid phase exchange coeff. k_v_o (Thomas Table 15-3) using the lowest of the calculated values	1/h	0.008	0.008	0.008	0.008	0.008
Overall chemical liquid phase exchange coeff. k_v_c (Thomas Eq 15-22)	1/h	0.0028	0.0033	0.0024	0.0031	0.0033
Fraction Remaining (Ci/C0) (Thomas Eq 15-11)	[-]	98.93%	98.76%	99.09%	98.80%	98.76%
Removal (1-Ci/C0)	**[-]**	**1.07%**	**1.24%**	**0.91%**	**1.20%**	**1.24%**

Constants			
1.76013E-05	Oxygen diffusion coefficient		
Retention time (h)	Reservoir Volume	Flow Rate (plant capacity)	
3.84	800000 gal	5000000	gpd

CLJA_WATERMODELING_07-0000003169

Estimated Volatile Losses in the Recarbonation Basin (Flow-Through Only, Assuming No CO2 Bubbling) at Hadnot Point Using the Smith Method for Highly Volatile Compounds as Presented by Thomas (1990), pages 15-17 to 15-21

Parameter	Units	PCE	TCE	12-tDCE	VC	Benzene
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Lab Measured k_v_c/k_v_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.52	0.57	0.47	0.56	0.57
Diffusion Coefficient Ratio D_c/D_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.4	0.44	0.66	0.79	0.45
Overall oxygen liquid phase exchange coeff. k_v_o (Thomas Table 15-3) using the lowest of the calculated values	1/h	0.008	0.008	0.008	0.008	0.008
Overall chemical liquid phase exchange coeff. k_v_c (Thomas Eq 15-22)	1/h	0.0028	0.0033	0.0024	0.0031	0.0033
Fraction Remaining (Ci/C0) (Thomas Eq 15-11)	[-]	99.98%	99.97%	99.98%	99.97%	99.97%
Removal (1-Ci/C0)	**[-]**	**0.02%**	**0.03%**	**0.02%**	**0.03%**	**0.03%**

Constants			
1.76013E-05	Oxygen diffusion coefficient		
Retention time (h)	Basin Volume		Flow Rate (plant capacity)
0.08	17000 gal		5000000 gpd

CLJA_WATERMODELING_07-0000003169

Estimated Volatile Losses in the Sand Filters at Hadnot Point Using the Smith Method For Highly Volatile Compounds as Presented by Thomas (1990), pages 15-17 to 15-21

Parameter	Units	PCE	TCE	12-tDCE	VC	Benzene
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Lab Measured k_v_c/k_v_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.52	0.57	0.47	0.56	0.57
Diffusion Coefficient Ratio D_c/D_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.4	0.44	0.66	0.79	0.45
Overall oxygen liquid phase exchange coeff. k_v_o (Thomas Table 15-3) using the lowest of the calculated values	1/h	0.008	0.008	0.008	0.008	0.008
Overall chemical liquid phase exchange coeff. k_v_c (Thomas Eq 15-22)	1/h	0.0028	0.0033	0.0024	0.0031	0.0033
Fraction Remaining (Ci/C0) (Thomas Eq 15-11)	[-]	99.91%	99.89%	99.92%	99.90%	99.89%
Removal (1-Ci/C0)	**[-]**	**0.09%**	**0.11%**	**0.08%**	**0.10%**	**0.11%**

Constants

1.76013E-05 Oxygen diffusion coefficient

Retention time (h)

0.33 AHEC (2004) Appendix C

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Estimated Volatile Losses in the Finished Reservoir at Tarawa Terrace Using the Smith Method for Highly Volatile Compounds as Presented by Thomas (1990), pages 15-17 to 15-21

Parameter	Units	PCE	TCE	12-tDCE	VC	Benzene
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Lab Measured k_v_c/k_v_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.52	0.57	0.47	0.56	0.57
Diffusion Coefficient Ratio D_c/D_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.4	0.44	0.66	0.79	0.45
Overall oxygen liquid phase exchange coeff. k_v_o (Thomas Table 15-3) using the lowest of the calculated values	1/h	0.008	0.008	0.008	0.008	0.008
Overall chemical liquid phase exchange coeff. k_v_c (Thomas Eq 15-22)	1/h	0.0028	0.0033	0.0024	0.0031	0.0033
Fraction Remaining (Ci/C0) (Thomas Eq 15-11)	[-]	95.07%	94.31%	95.80%	94.50%	94.31%
Removal (1-Ci/C0)	**[-]**	**4.93%**	**5.69%**	**4.20%**	**5.50%**	**5.69%**

Constants

1.76013E-05	Oxygen diffusion coefficient		
Retention time (h)	Reservoir Volume	Flow Rate (plant capacity)	
18	750000 gal	1000000 gpd	

CLJA_WATERMODELING_07-0000003183

Estimated Volatile Losses in the Water Tower at Tarawa Terrace Using the Smith Method for Highly Volatile Compounds as Presented by Thomas (1990), pages 15-17 to 15-21

Parameter	Units	PCE	TCE	12-tDCE	VC	Benzene
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Lab Measured k_v_c/k_v_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.52	0.57	0.47	0.56	0.57
Diffusion Coefficient Ratio D_c/D_0 (Thomas Table 15-2 for PCE, TCE, Benzene, calculated for DCE, VC)	[-]	0.4	0.44	0.66	0.79	0.45
Overall oxygen liquid phase exchange coeff. k_v_o (Thomas Table 15-3) using the lowest of the calculated values	1/h	0.008	0.008	0.008	0.008	0.008
Overall chemical liquid phase exchange coeff. k_v_c (Thomas Eq 15-22)	1/h	0.0028	0.0033	0.0024	0.0031	0.0033
Fraction Remaining (Ci/C0) (Thomas Eq 15-11)	[-]	98.33%	98.07%	98.58%	98.13%	98.07%
Removal (1-Ci/C0)	**[-]**	**1.67%**	**1.93%**	**1.42%**	**1.87%**	**1.93%**

Constants

1.76013E-05 Oxygen diffusion coefficient

Retention time (h) Water Tower Flow Rate (plant capacity)

6 250000 gal 1000000 gpd

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Estimated Volatile Losses in a "Water Buffalo" Water Tank During a Change in Air Temperature

		PCE	TCE	12-tDCE	VC	Benzene
Henry's Law Constant	atm*m3/mol	1.31E-02	7.07E-03	7.42E-03	2.78E-02	5.50E-03
Diffusion Coefficient in Water	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.39E-05	8.99E-06
Diffusion Coefficient in Air	cm2/s	0.0813	0.089	8.64E-02	0.105	0.0982
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3/mol*K	8.21E-05	8.21E-05	8.21E-05	8.21E-05	8.21E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15

Partition mass into headspace

Vessel Volume	m3	1.5	1.5	1.5	1.5	1.5
Water Volume	m3	0.75	0.5	0.75	0.75	0.75
Concentration in Water	ug/L	1	1	1	1	1
	umol/L	0.0060	0.0076	0.0103	0.0160	0.0128
Concentration in Air at equilibrium	ppmv (10^-6 atm partial pressure)	0.08	0.05	0.08	0.44	0.07
Mass in Water	ug	750	500	750	750	750
Mass in Headspace at Equilibrium	m3	5.93E-08	5.38E-08	5.74E-08	3.34E-07	5.28E-08
	mol	2.46E-06	2.24E-06	2.39E-06	1.39E-05	2.20E-06
	ug	408.44	293.91	231.34	866.76	171.48
Percent of mass in headspace at equilibrium	[-]	54%	59%	31%	116%	23%

Headspace volume at 20 deg C	m3	0.75	1	0.75	0.75	0.75
Headspace volume at 30 deg C	m3	7.76E-01	1.03E+00	7.76E-01	7.76E-01	7.76E-01
Volume vented due to change in temperature	m3	2.56E-02	3.41E-02	2.56E-02	2.56E-02	2.56E-02
Volume vented due to change in temperature	m3	2.02E-09	1.84E-09	1.96E-09	1.14E-08	1.80E-09
Moles vented due to chang in temperature	mol	8.13E-08	7.38E-08	7.87E-08	4.57E-07	7.24E-08
Mass vented due to change in temperature	ug	13.47	9.70	7.63	28.59	5.66
Percent of mass lost due to change in temperature	[-]	1.8%	1.9%	1.0%	3.8%	0.8%

Water Buffalo Dimensions

M107A2	model	
400	gal	volume
17.125	inches	manhole diameter
4.625	inches	filler pipe cover gasket outer diameter
3.75	inches	filler pipe cover gasket inner diameter
31.97	inches	tank height
0.81	meters	tank height
16.1	inches	strainer length
0.41	meters	strainer length

References:

ATSDR_WATERMODELING_01-0000917100 - ATSDR_WATERMODELING_01-0000917102

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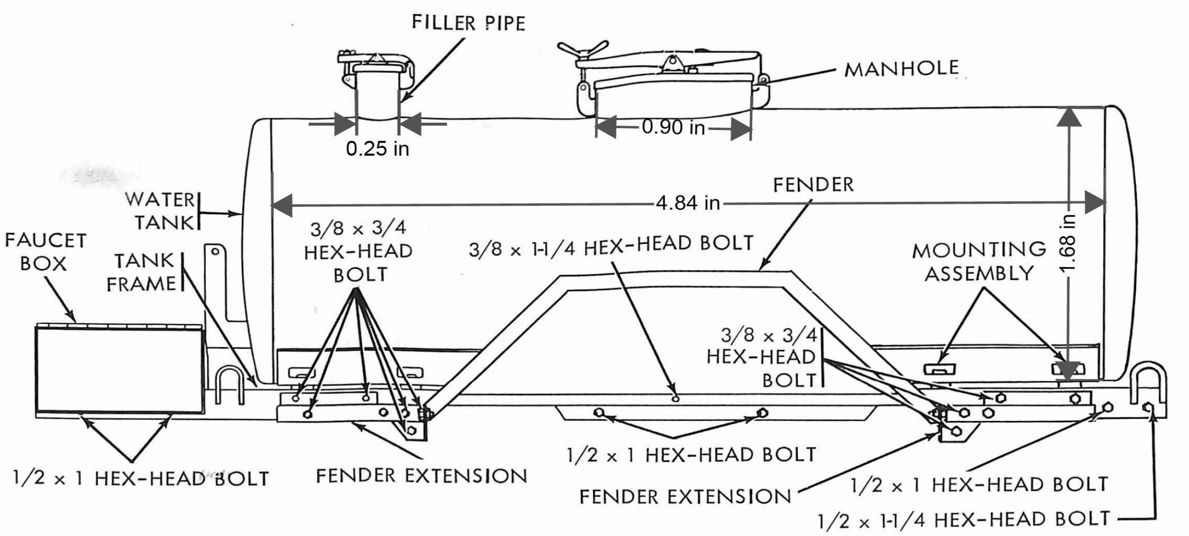
DODParts.com. NSN 2510-00-741-2233 Manhole Cover <https://dodparts.com/nsn/2510-00-741-2233>. Accessed November 21, 2024.



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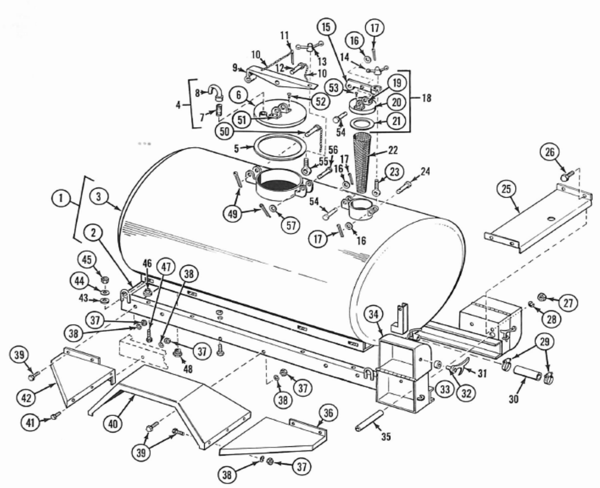

NON-SUPPLY ITEMS

KEY	ITEM	PART NO.	KEY	ITEM	PART NO.
1	TANK ASSY	8384144	35	WASHER	446178
2	FRAME	8384143	36	EXTENSION	8384134
3	TANK	8384097	37	NUT	120371
6	COVER	7979648	38	WASHER	120384
15	HINGE	7979622	39	SCREW	123605
16	WASHER	120394	40	FENDER	8384138
17	PIN	121222	41	SCREW	120424
19	BRACKET	7979666	42	EXTENSION	8384133
20	COVER	7979665	44	WASHER	8384130
21	GASKET	7979667	45	NUT	451027
23	BOLT	7979634	47	SCREW	428736
25	PLATE	8331227	49	PIN	187988
26	SCREW	123520	50	PIN	7412295
27	NUT	120369	51	BRACKET	7979647
28	WASHER	120382	52	RIVET	142880
29	CLAMP	8365414	53	RIVET	588384
32	PIN	8331226	57	WASHER	120396
33	SPACER	8384102			
34	COVER	8384106			

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FIGURE 133. WATER TANK, TANK FRAME, AND RELATED PARTS - (M106A1, M107A1, M107A2, M107A2C).

(1) ILLUST (a) FIG NO	(b) ITEM NO	(2) SOURCE, MAINT AND RECOVERABILITY CODE (a) MATERIEL CODE	(b) SOURCE	(c) MAINTENANCE LEVEL	(d) RECOVERABILITY	(3) FEDERAL STOCK NO	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) QTY INC IN UNIT	(7) 15-DAY MAINTENANCE ALLOWANCE PER 100 EQUIPMENTS (a) CO OR BTRY	(b) SEP CO SEP BN OR REGT	(c) 3RD ECH (DIR SUP)	(d) 4TH ECH (GEN SUP)
							WATER TANK, TANK FRAME, AND RELATED PARTS - (M106A1, M107A1, M107A2, and M107A2C) (Fig. 133)						
133	4		P1	O		2510-741-2233	COVER: (7412233)	ea	1				
133	5		P	O		2510-741-2242	GASKET: (7412242)	ea	1				
133	7		P1	O		4730-741-2249	NIPPLE: (7412249)	ea	1				
133	8		P1	O		2510-703-9760	BEND: (7039760)	ea	1				
133	9		P	O		2510-741-2247	HINGE: (7412247)	ea	1				
133	10	55	P	O		4010-186-9403	CHAIN: 6 in. (42-C-16887)	ft	≠				
133	11		P	O		5315-059-0210	PIN, COTTER: (96906-24665-504)	ea	1				
133	12		P	O		2540-741-2283	PIN AND CHAIN ASSEMBLY: (7412283)	ea	2				
133	13		P	O		5310-741-2276	NUT, PLAIN, WING: (7412276)	ea	1				
133	14		P	O		5310-050-3103	NUT, PLAIN, WING: (503103)	ea	1				
133	18		P1	O		2510-741-2234	COVER: w/HINGE, assembly (7412234)	ea	1				
133	22		P	O		4730-546-5898	STRAINER ELEMENT, SEDIMENT: (8735825)	ea	1				
133	24		P	O		5315-741-2285	PIN, STRAIGHT, HEADED: (7412285)	ea	1				
133	30		P	O		4720-278-4895	HOSE, RUBBER: (8330817)	ea	1				
133	31		P	O		2540-040-2414	LOCK: (8330823)	ea	1				
133	35	5	P	F		4462-607-0001	PIPE, STEEL: galvenized, std. wt., 1-1/4 in.	ft	≠				
133	43		P	F		5330-575-9791	WASHER, NONMETALLIC: (8331544)	ea	8				
133	46		P	O		5340-537-2212	MOUNT, RESILIENT: (8331543)	ea	8				
133	48		P	O		4730-525-7160	PLUG, PIPE: (8735929)	ea	1				
133	48		P	O		4730-703-9752	PLUG, PIPE: (7039752)	ea	1				
133	54		P	O		5315-741-2286	PIN: (7412286)	ea	2				
133	55		P	O		5306-741-2228	BOLT, EYE: (7412228)	ea	1				
133	56		P	O		5320-014-2390	RIVET SOLID: (142390)	ea	1				
			P	F		8010-533-9687	PARTS KIT, WATER TANK INTERIOR COATING (5702157) COMPOSED OF: 2 QTS EPON COATING RW-100-1A 2 QTS EPON COATING RW-100-1B	ea	≠				

Estimated Volatile Losses in a "Water Buffalo" Water Tank During Filling, Using the Experimental Result for TCE from McKone and Knezovich (1991)

Variable	Units	PCE	TCE	trans12DCE	VC	Benzene
Henry's Law Constant*	atm*m3/mol	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
Diffusion Coefficient in Water**	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Diffusion Coefficient in Air**	cm2/s	0.0813	0.089	8.64E-02	1.03E-01	0.0982
Molecular Weight	g/mol	165.82	131.39	96.95	62.5	78.11
Ideal Gas Constant R	atm*m3/mol*K	8.206E-05	8.206E-05	8.206E-05	8.206E-05	8.206E-05
Temperature	K	293.15	293.15	293.15	293.15	293.15
Kla (McKone Equation 8)	m/s	3.32E-07	3.56E-07	4.42E-07	4.96E-07	3.71E-07
Water Concentration	mg/L	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Mass transfer rate (experimental for TCE, scaled based on Kla for others)	mg/min	5.14E-01	5.51E-01	6.85E-01	7.67E-01	5.74E-01
mass transferred to air	mg	1.03E+01	1.10E+01	1.37E+01	1.53E+01	1.15E+01
Mass transfer rate (experimental results for TCE (McKone and Knezovich 1991), and for the other chemicals the loss rate was scaled by the ratio of overall mass transfer coefficients for the chemical and TCE)		0.54	0.58	0.72	0.81	0.60

Experimental Parameters (McKone and Knezovich 1991)

0.1	mg/L	TCE in influent water
22	C	water temperature
0.58	-	TCE transfer efficiency
4.7913043	mg/m3	TCE in shower air
2.3	m3	shower room air volume
190	L	total shower water volume
11.02	mg	mass TCE lost to air
19	mg	mass TCE in total water used
0.58	[-]	fraction TCE lost to air
9.5	L/min	flow rate
20	min	shower time
0.551	mg/min	mass transfer rate

*Sources: AHEC (2004) for TCE and PCE; EPA's online tool at 20 degrees centigrade, method by Washington (1996) for VC and DCE, method by Peng and Wang (1997) for benzene.

**Sources: AHEC (2004) for TCE, PCE, and benzene; Chiao et al. 1994a,c for DCE, VC.

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Attachment D

Travel Time Calculations and Supporting Materials

	Shallow Aquifer	Local Confining Unit	Pumped Aquifer	
	L1 (horizontal)	**L2 (vertical)**	**L3 (horizontal)**	
L (ft)	500	10	500	
Dh (ft)	7	1	7	
DL (ft)	900	10	660	
i	0.008	0.100	0.011	
K (ft/day)	25	0.1	7	
n	0.2	0.2	0.2	
V (ft/day)	0.972	0.050	0.371	
T (L/V) days	514.29	200.00	1,346.94	
yrs	1.41	0.55	3.69	
		Total T	5.65	yrs
		Retarded T	19.65	yrs

	Shallow Aquifer	Local Confining Unit	Pumped Aquifer	
	L1 (horizontal)	**L2 (vertical)**	**L3 (horizontal)**	
L (ft)	800	10	200	
Dh (ft)	7	1	7	
DL (ft)	900	10	660	
i	0.008	0.100	0.011	
K (ft/day)	25	0.1	7	
n	0.2	0.2	0.2	
V (ft/day)	0.972	0.050	0.371	
T (L/V) days	822.8571429	200	538.7755102	
yrs	2.25	0.55	1.48	
		Total T	4.28	yrs
		Retarded T	14.89	yrs

	Shallow Aquifer	Local Confining Unit	Pumped Aquifer	
	L1 (horizontal)	**L2 (vertical)**	**L3 (horizontal)**	
L (ft)	200	10	800	
Dh (ft)	7	1	7	
DL (ft)	900	10	660	
i	0.008	0.100	0.011	
K (ft/day)	25	0.1	7	
n	0.2	0.2	0.2	
V (ft/day)	0.972	0.050	0.371	
T (L/V) days	205.7142857	200	2155.102041	
yrs	0.56	0.55	5.90	
		Total T	7.02	yrs
		Retarded T	24.42	yrs

Gradient, i	Dh/DL		
Velocity, V	(K x i) / n		
Travel Time, T	Distance / Velocity		
Site-specific Retardation Factor for PCE, R	3.5		
Retarded Travel Time	T x R		
Calculation for R:			
	foc = 0.0013	(using median value from site specific data between 10 ft and 121 ft to represent aquifer materials (outliers omitted and duplicate results averaged)	
	logKoc = 2.37	(literature value for PCE; same as in ATSDR)	
	n = 0.2	porosity	
	Db = 1.65 g/cm3	bulk density	
	Kd = foc*Koc	Distribution coefficient	
	R = 1 + Kd*Db/n	Retardation Coefficient	
Calculated Retardation Factor for PCE, R:	3.5		

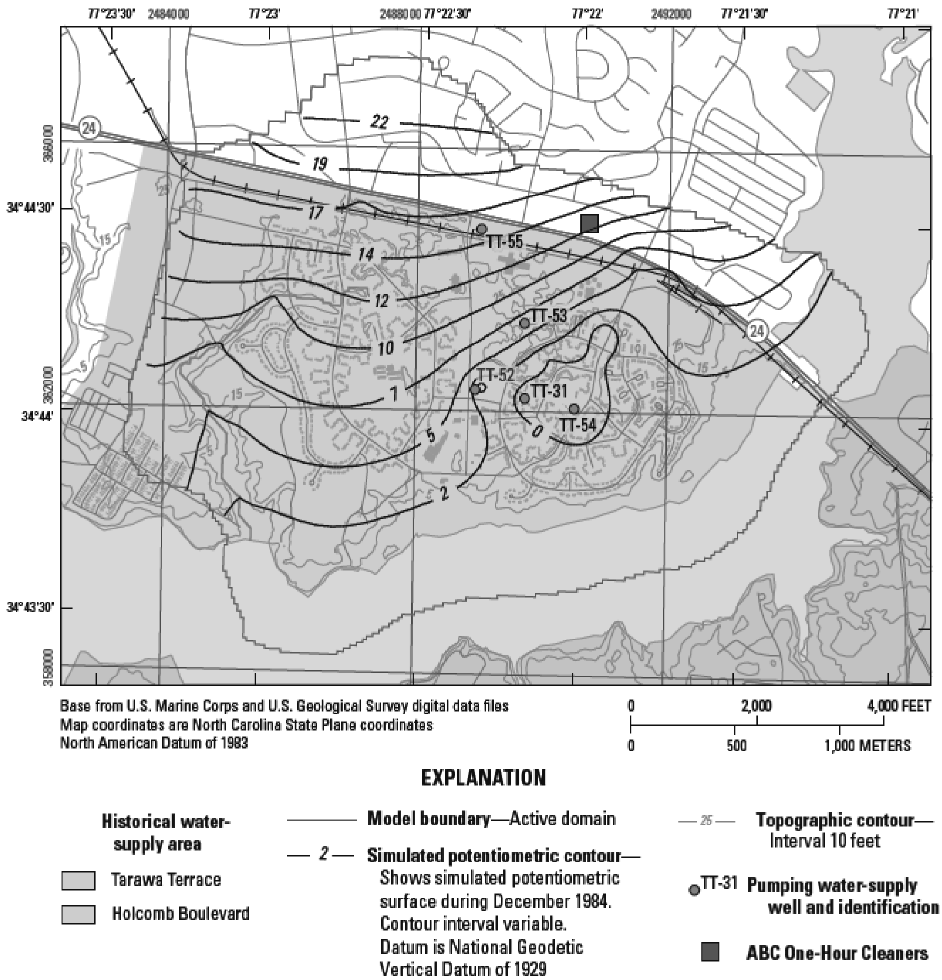

Figure C18. Simulated potentiometric levels, combined Tarawa Terrace aquifer and Upper Castle Hayne aquifer–River Bend unit (model layer 1), stress period 408 (December 1984), Tarawa Terrace and vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina.

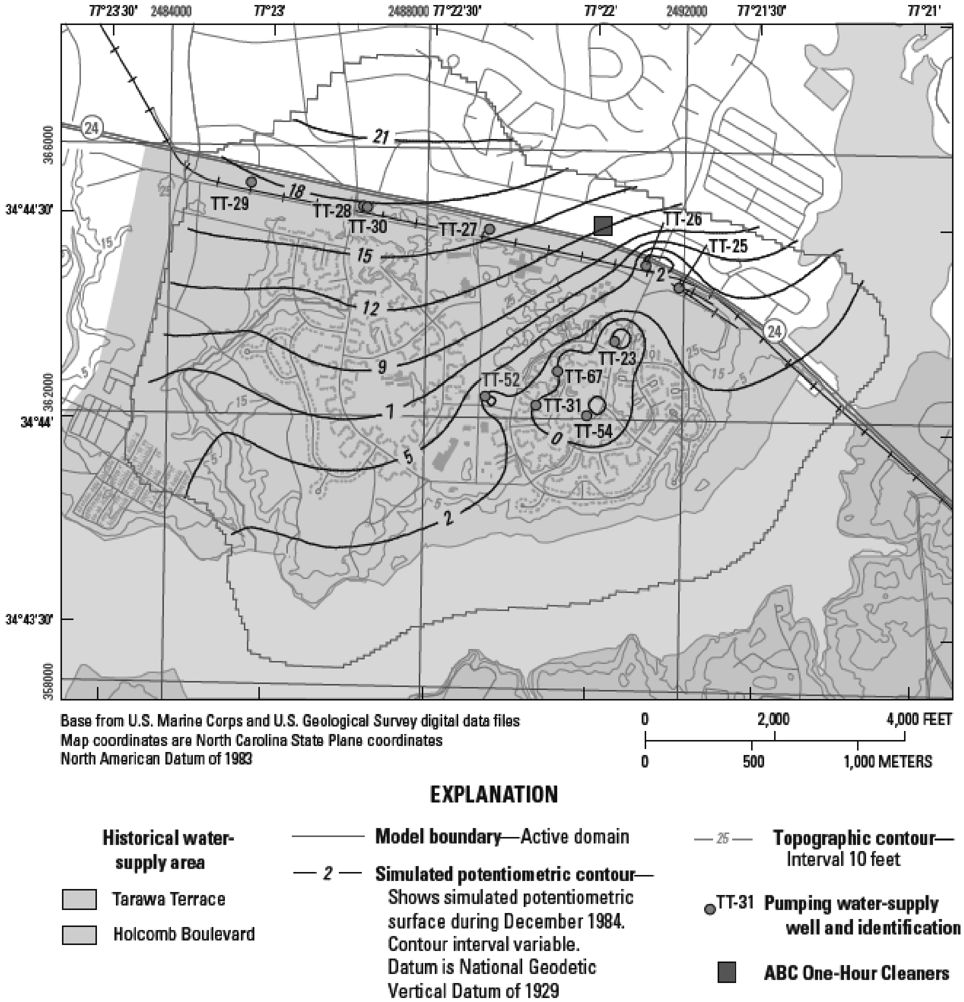

Figure C19. Simulated potentiometric levels, Upper Castle Hayne aquifer–Lower unit (model layer 3), stress period 408 (December 1984), Tarawa Terrace and vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina.

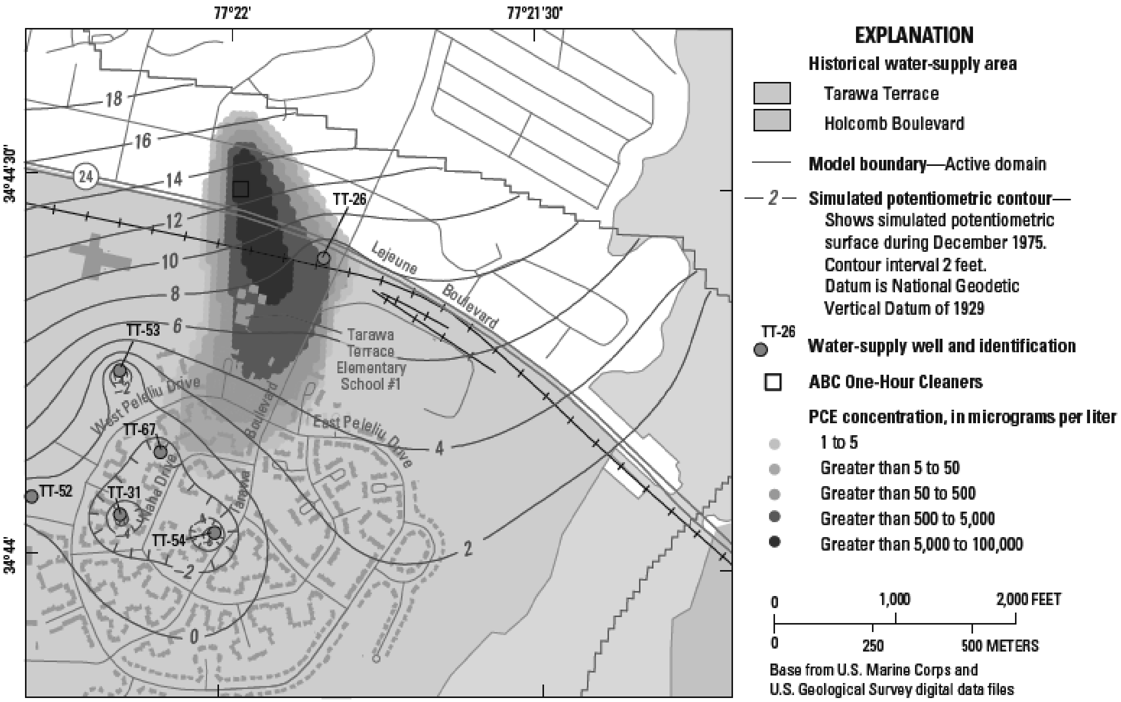

Figure F20. Simulated distribution of tetrachloroethylene (PCE) and potentiometric levels within part of model layer 1, Tarawa Terrace and vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina, December 1975.

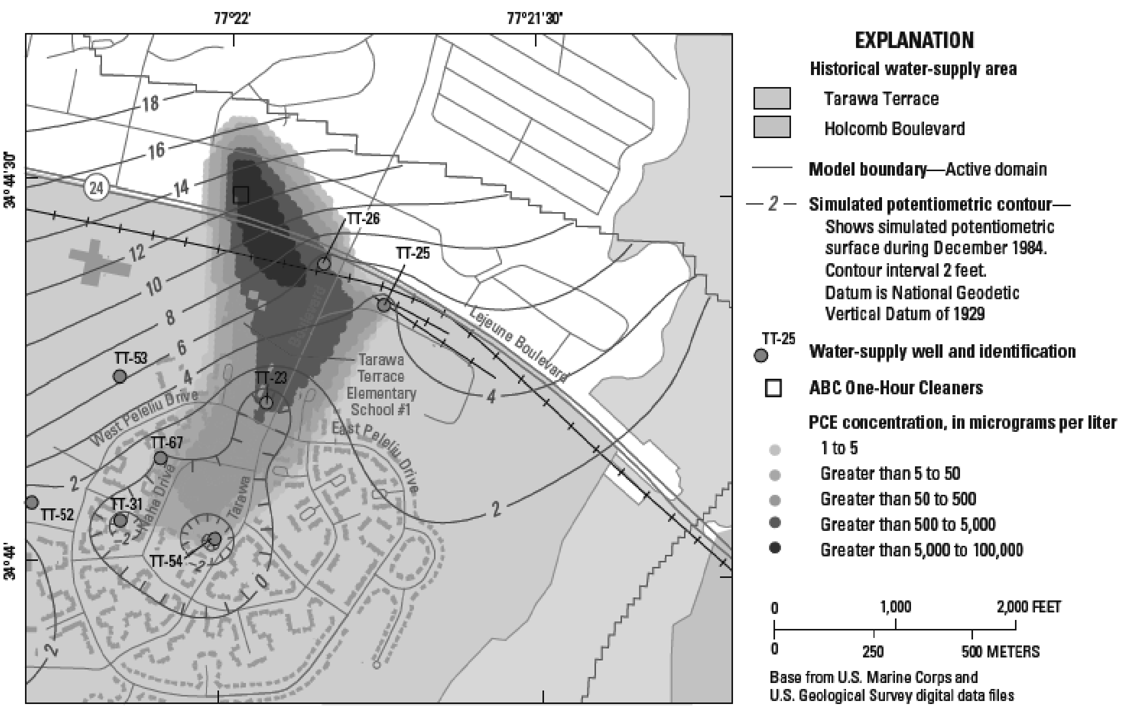

Figure F21. Simulated distribution of tetrachloroethylene (PCE) and potentiometric levels within part of model layer 1, Tarawa Terrace and vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina, December 1984.

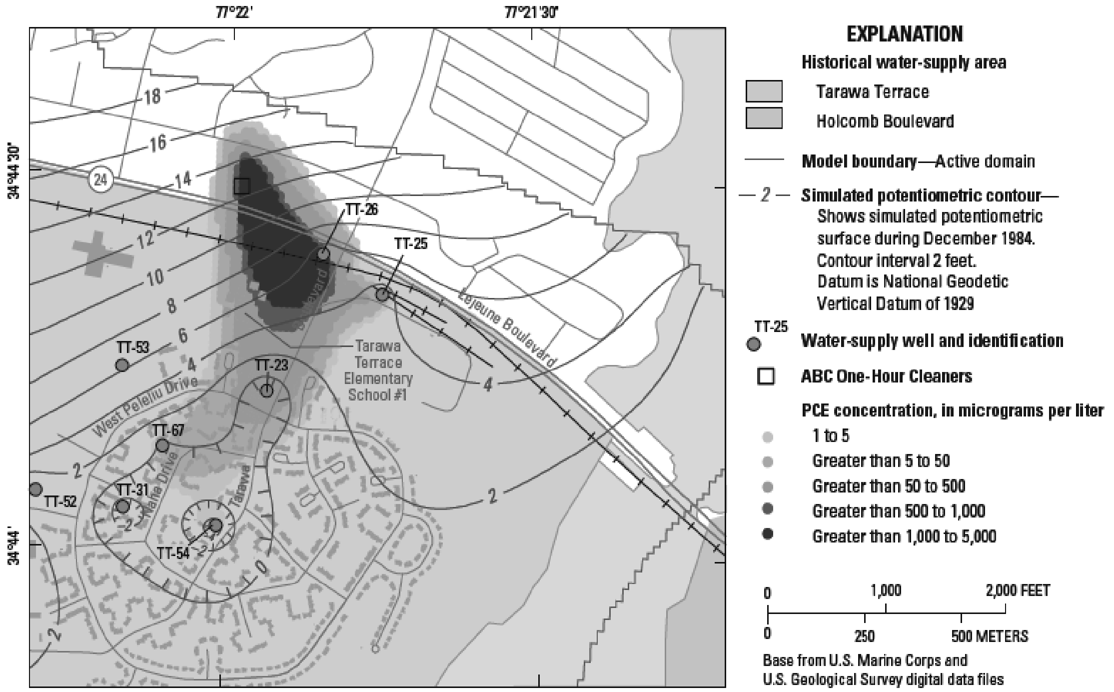

Figure F24. Simulated distribution of tetrachloroethylene (PCE) and potentiometric levels within part of model layer 3, Tarawa Terrace and vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina, December 1984.

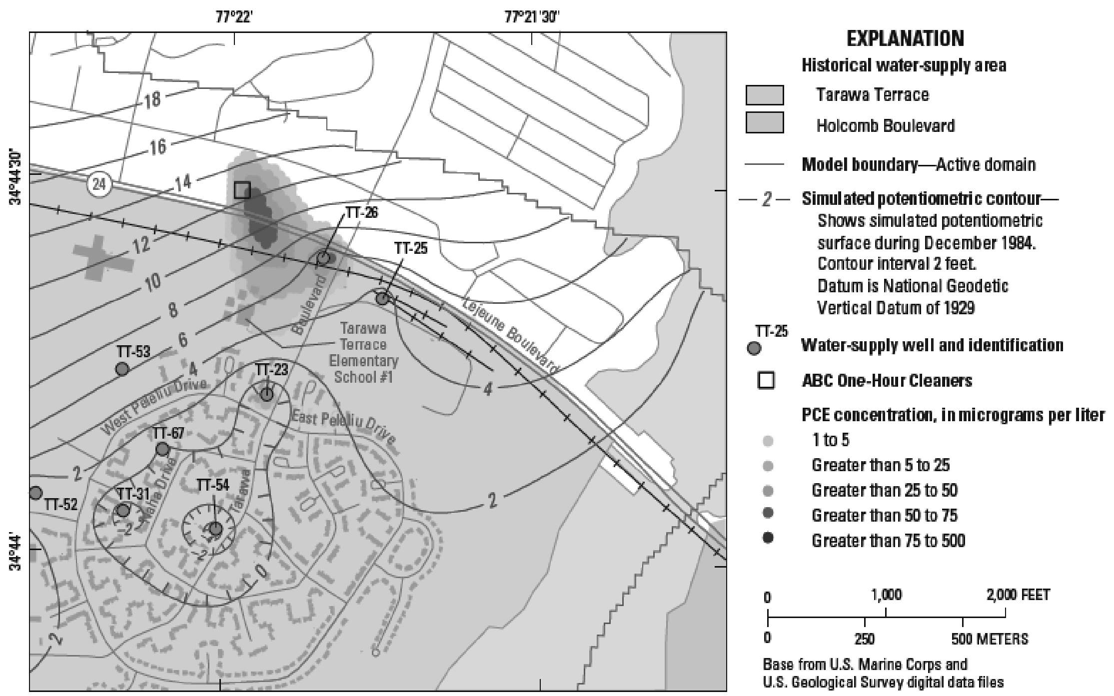

Figure F25. Simulated distribution of tetrachloroethylene (PCE) and potentiometric levels within part of model layer 5, Tarawa Terrace and vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina, December 1984.

Table F1. Geohydrologic units, unit thickness, and corresponding model layer, Tarawa Terrace and vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina.

[Units are listed shallowest to deepest and youngest to oldest; N/A, not applicable]

Geohydrologic unit	Thickness range, in feet	Model layer
Tarawa Terrace aquifer	8 to 30	1
Tarawa Terrace confining unit	8 to 20	1
Castle Hayne aquifer system		
Upper Castle Hayne aquifer–River Bend unit	16 to 56	1
Local confining unit	7 to 17	2
Upper Castle Hayne aquifer–Lower unit	8 to 30	3
Middle Castle Hayne confining unit	12 to 28	4
Middle Castle Hayne aquifer	32 to 90	5
Lower Castle Hayne confining unit	18 to 30	6
Lower Castle Hayne aquifer	41 to 64	7
Beaufort confining unit	N/A	

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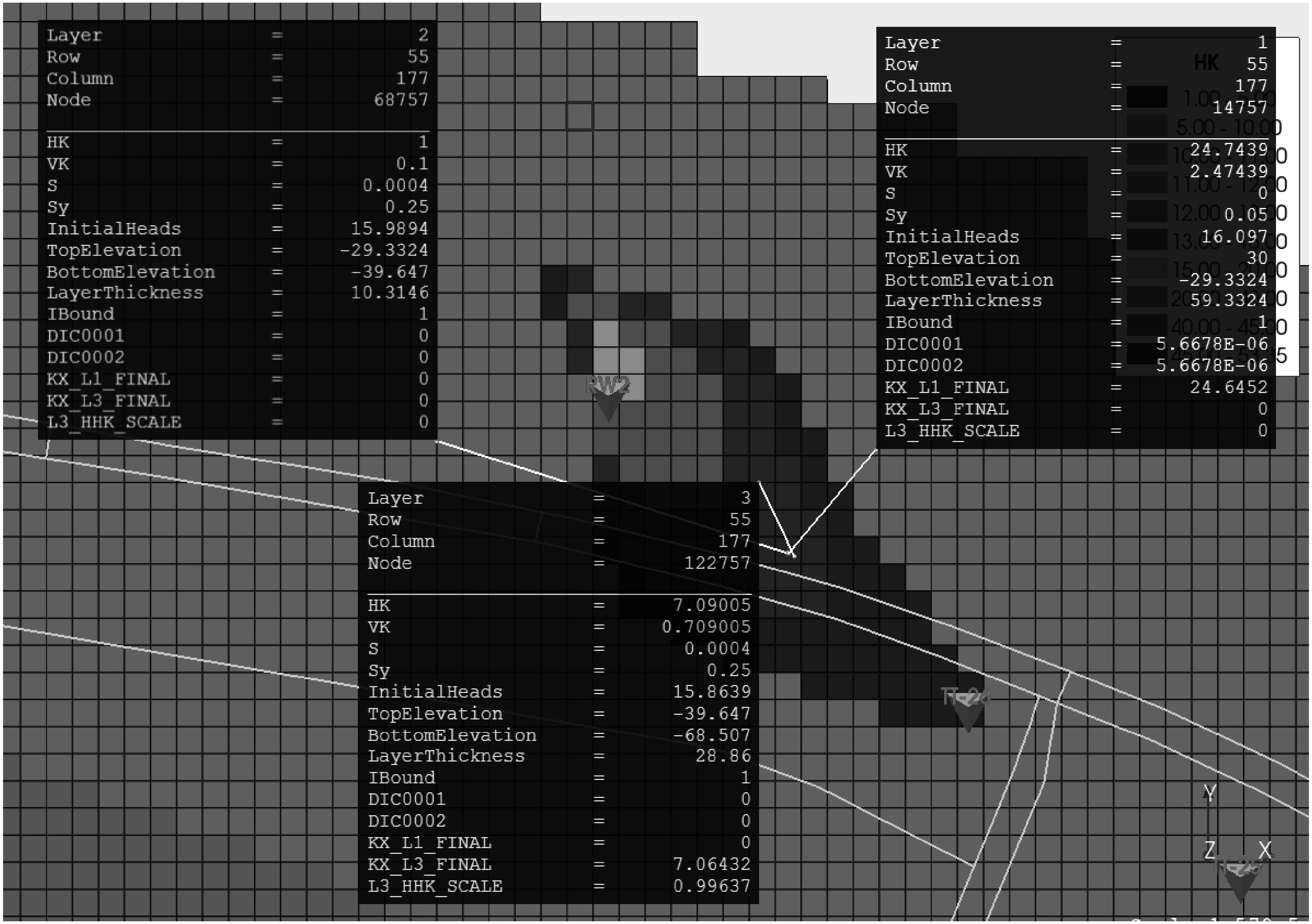
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Column = 177
Node = 68757
HK = 1
VK = 0.1
S = 0.0004
Sy = 0.25
InitialHeads = 15.9894
TopElevation = -29.3324
BottomElevation = -39.647
LayerThickness = 10.3146
IBound = 1
DIC0001 = 0
DIC0002 = 0
KX_L1_FINAL = 0
KX_L3_FINAL = 0
L3_HHK_SCALE = 0
Layer = 1
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Column = 177
Node = 14757
HK = 24.7439
VK = 2.47439
S = 0
Sy = 0.05
InitialHeads = 16.097
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BottomElevation = -29.3324
LayerThickness = 59.3324
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DIC0001 = 5.6678E-06
DIC0002 = 5.6678E-06
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KX_L3_FINAL = 0
L3_HHK_SCALE = 0
HK
Layer = 3
Row = 55
Column = 177
Node = 122757
HK = 7.09005
VK = 0.709005
S = 0.0004
Sy = 0.25
InitialHeads = 15.8639
TopElevation = -39.647
BottomElevation = -68.507
LayerThickness = 28.86
IBound = 1
DIC0001 = 0
DIC0002 = 0
KX_L1_FINAL = 0
KX_L3_FINAL = 7.06432
L3_HHK_SCALE = 0.99637
RW2
Y
Z
X

Site-Specific Data for Kd

Sample	Date Sampled	Depth (ft)	TOC (mg/kg)	f_{oc}	Reference Citation
SWMU253-TW02	3/22/2002	10	2,005	0.002005	CLJA_WATERMODELING_07-0002047135; CLJA_WATERMODELING_07-0002045499; CLJA_WATERMODELING_07-0001379091
SWMU254-SS01*	7/18/2000	10	3,060	0.00306	CLJA_WATERMODELING_01-0000259216; CLJA_WATERMODELING_01-0000259590; CLJA_WATERMODELING_07-0001379091
SWMU265-GW02	3/24/2002	10	976	0.000976	CLJA_WATERMODELING_07-0002047135; CLJA_WATERMODELING_07-0002045576; CLJA_WATERMODELING_07-0001379092
BLDG902-SB03-10-11-07B	5/19/2007	10.5	810	0.00081	CLJA_WATERMODELING_07-0001380120
SWMU360-TW04	3/25/2002	12	875	0.000875	CLJA_WATERMODELING_07-0002047135; CLJA_WATERMODELING_07-0002046015; CLJA_WATERMODELING_07-0001379091
SWMU43-GW02	3/25/2002	12	719	0.000719	CLJA_WATERMODELING_01-0000259216; CLJA_WATERMODELING_01-0000259580; CLJA_WATERMODELING_07-0001379092
SWMU258-GW02	7/18/2000	14	30,400	0.0304	CLJA_WATERMODELING_01-0000259216; CLJA_WATERMODELING_07-0001379091
SWMU261-GW02	7/18/2000	14	3,930	0.00393	CLJA_WATERMODELING_01-0000259216; CLJA_WATERMODELING_01-0000259597; CLJA_WATERMODELING_07-0001379091
SWMU43-GW01	7/18/2000	14	589	0.000589	CLJA_WATERMODELING_01-0000259216; CLJA_WATERMODELING_01-0000259586; CLJA_WATERMODELING_07-0001379092
SWMU43-GW02	7/17/2000	14	341	0.000341	CLJA_WATERMODELING_07-0002047135; CLJA_WATERMODELING_07-0002045472; CLJA_WATERMODELING_07-0001379092

Site-Specific Data for Kd

Sample	Date Sampled	Depth (ft)	TOC (mg/kg)	f_{oc}	Reference Citation
SWMU43-GW03*	7/17/2000	14	382.5	0.000383	CLJA_WATERMODELING_01-0000259216; CLJA_WATERMODELING_01-0000259582; CLJA_WATERMODELING_07-0001379092
IS26-04	11/21/1997	16.5	1,510	0.00151	CLJA_WATERMODELING_01-0000283421; CLJA_WATERMODELING_01-0000283606
IS26-05	11/21/1997	18	5,560	0.00556	CLJA_WATERMODELING_01-0000283421; CLJA_WATERMODELING_01-0000283607
IS26-06	11/21/1997	19	6,420	0.00642	CLJA_WATERMODELING_01-0000283421; CLJA_WATERMODELING_01-0000283608
BLDG902-SB03-25-26-07B	5/19/2007	25.5	210	0.00021	CLJA_WATERMODELING_07-0001380121
BLDG902-SB03-43-44-07B	5/20/2007	43.5	300	0.0003	CLJA_WATERMODELING_07-0001380122
BLDG902-SB03-46-47-07B	5/20/2007	46.5	24,000	0.024	CLJA_WATERMODELING_07-0001380123
BLDG902-SB03-55-56-07B	5/20/2007	55.5	1,300	0.0013	CLJA_WATERMODELING_07-0001380124
BLDG902-SB03-83-84-07B	5/20/2007	83.5	1,200	0.0012	CLJA_WATERMODELING_07-0001380125
BLDG902-SB03-100-101-07B	5/20/2007	100.5	28,000	0.028	CLJA_WATERMODELING_07-0001380126
BLDG902-SB03-120-121-07B	5/20/2007	120.5	2,600	0.0026	CLJA_WATERMODELING_07-0001380127
	Median		1,300	0.00130	

*Average of two duplicates

Attachment E

COC Concentration Data

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
C1	4/24/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C1	4/24/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C1	4/24/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C1	4/24/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C1	4/24/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C1	9/21/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C1	9/21/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C1	9/21/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C1	9/21/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C1	9/21/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C10	10/15/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C10	10/15/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C10	10/15/1993	PCE	4.8J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C10	10/15/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C10	10/15/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C11	10/15/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C11	10/15/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C11	10/15/1993	PCE	0.64J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C11	10/15/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C11	10/15/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C2	4/23/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C2	4/23/1992	DCE	9J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C2	4/23/1992	PCE	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C2	4/23/1992	TCE	3J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C2	4/23/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C2	10/21/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C2	10/21/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C2	10/21/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C2	10/21/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C2	10/21/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C3	4/29/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C3	4/29/1992	DCE	14		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C3	4/29/1992	PCE	7J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C3	4/29/1992	TCE	28		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
C3	4/29/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C3	9/23/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C3	9/23/1993	DCE	21		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C3	9/23/1993	PCE	120		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C3	9/23/1993	TCE	43		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C3	9/23/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C4	4/22/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C4	4/22/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C4	4/22/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C4	4/22/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C4	4/22/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C4	9/22/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C4	9/22/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C4	9/22/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C4	9/22/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C4	9/22/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C5	4/23/1992	Benzene	18J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C5	4/23/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C5	4/23/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C5	4/23/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C5	4/23/1992	Toluene	25J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C5	9/22/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C5	9/22/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C5	9/22/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C5	9/22/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C5	9/22/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C9	9/29/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
C9	9/29/1993	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C9	9/29/1993	PCE	0.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C9	9/29/1993	TCE	0.1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
C9	9/29/1993	Toluene	0.7J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-10-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-24	12/15/1991	PCE	2.5J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-10-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-40	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-40	12/15/1991	Benzene	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-10-40	12/15/1991	PCE	0.8J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-40	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-40	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-10-40	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-11-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-24	12/15/1991	PCE	12.2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-34	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-34	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-34	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-11-34	12/15/1991	PCE	2.8J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-34	12/15/1991	PCE	8J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-34	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-34	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-11-34	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-1-17.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-1-17.5	12/15/1991	PCE	4		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-1-17.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-24	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-24	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-12-24	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-24	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-24	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-24	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-12-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-40	12/15/1991	PCE	3.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-12-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-19.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-13-19.5	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-19.5	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-13-19.5	12/15/1991	PCE	0.76J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-19.5	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-19.5	12/15/1991	TCE	0.19J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-19.5	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-19.5	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-13-32	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-32	12/15/1991	PCE	0.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-13-32	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-1-39	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-1-39	12/15/1991	PCE	1.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-1-39	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-20	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-20	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-20	12/15/1991	Benzene	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-14-20	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-14-20	12/15/1991	PCE	0.22J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-20	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-20	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-20	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-20	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-14-20	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-14-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-40	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-40	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-40	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-14-40	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-24	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-24	12/15/1991	Benzene	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-15-24	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-24	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-15-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-24	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-24	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-15-35.5	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-15-35.5	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-15-36.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-36.5	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-36.5	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-36.5	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-36.5	12/15/1991	TCE	2.8J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-15-36.5	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-16-30	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-16-30	12/15/1991	PCE	0.23J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-16-30	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-17-24	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-17-24	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-17-44	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-17-44	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-18-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-24	12/15/1991	PCE	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-36	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-36	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-36	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-18-36	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-36	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-36	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-36	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-18-36	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-19-25	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-25	12/15/1991	PCE	53.3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-25	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-35.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-35.5	12/15/1991	1,2-tDCE	170		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-19-35.5	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-19-35.5	12/15/1991	PCE	157		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-35.5	12/15/1991	PCE	200		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-35.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-35.5	12/15/1991	TCE	100		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-19-35.5	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-20-34	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-34	12/15/1991	1,2-tDCE	5700		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-34	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-20-34	12/15/1991	PCE	500		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-34	12/15/1991	PCE	30000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-34	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-34	12/15/1991	TCE	2900		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-34	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-20-41	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-41	12/15/1991	1,2-tDCE	89		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-41	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-20-41	12/15/1991	PCE	196		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-41	12/15/1991	PCE	43		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-41	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-41	12/15/1991	TCE	29		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-20-41	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-21-22	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-21-22	12/15/1991	1,2-tDCE	2300		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-21-22	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-21-22	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-21-22	12/15/1991	PCE	96		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-21-22	12/15/1991	PCE	6900		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-21-22	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-21-22	12/15/1991	TCE	1100		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-21-22	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-21-22	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-21-31.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-21-31.5	12/15/1991	PCE	13.5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-21-31.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-2-21.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-2-21.5	12/15/1991	PCE	1.5J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-2-21.5	12/15/1991	TCE	0.13J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-22-41	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-22-41	12/15/1991	PCE	5.2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-22-41	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-22A-30	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-22A-30	12/15/1991	PCE	740		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-22A-30	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-23-19	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-23-19	12/15/1991	PCE	2.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-23-19	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-23-45	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-23-45	12/15/1991	PCE	11		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-23-45	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-24-28	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-24-28	12/15/1991	PCE	14		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-24-28	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-24-38	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-24-38	12/15/1991	PCE	13		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-24-38	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-2-44.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-2-44.5	12/15/1991	PCE	5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-2-44.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-25-18	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-25-18	12/15/1991	PCE	8.2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-25-18	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-25-27	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-25-27	12/15/1991	PCE	6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-25-27	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-26-42	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-26-42	12/15/1991	PCE	5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-26-42	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-27-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-24	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-24	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-24	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-24	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-27	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-27	12/15/1991	PCE	4		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-27	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-37.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-37.5	12/15/1991	PCE	3.2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-37.5	12/15/1991	TCE	0.34J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-44	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-44	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-44	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-44	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-44	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-27-44	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-28-28	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-28-28	12/15/1991	PCE	2.7J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-28-28	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-28-41	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-28-41	12/15/1991	PCE	2.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-28-41	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-29-23	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-29-23	12/15/1991	PCE	1.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-29-23	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-29-26.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-29-26.5	12/15/1991	PCE	5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-29-26.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-30-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-30-24	12/15/1991	PCE	2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-30-24	12/15/1991	TCE	0.2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-30-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-30-40	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-30-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-31-29	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-31-29	12/15/1991	PCE	1.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-31-29	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-31-39	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-31-39	12/15/1991	PCE	1.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-31-39	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-3-21	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-3-21	12/15/1991	PCE	2.5J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-3-21	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-32-26	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-32-26	12/15/1991	PCE	1.3J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-32-26	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-32-38	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-32-38	12/15/1991	PCE	1.1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-32-38	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-33-28	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-33-28	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-33-28	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-33-36	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-33-36	12/15/1991	PCE	1.5J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-33-36	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-3-40.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-3-40.5	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-3-40.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-34-21.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-34-21.5	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-34-21.5	12/15/1991	TCE	0.3J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-34-34	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-34-34	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-34-34	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-35-30	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-35-30	12/15/1991	PCE	133		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-35-30	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-35-42	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-35-42	12/15/1991	PCE	7.5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-35-42	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-30	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-30	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-30	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-36-30	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-30	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-30	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-30	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-30	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-36-41	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-41	12/15/1991	PCE	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-36-41	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-37-27	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-37-27	12/15/1991	PCE	0.3J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-37-27	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-37-48	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-37-48	12/15/1991	PCE	1.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-37-48	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-38-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-38-24	12/15/1991	PCE	0.5J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-38-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-38-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-38-40	12/15/1991	PCE	1.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-38-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-23	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-23	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-23	12/15/1991	Benzene	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-39-23	12/15/1991	PCE	0.9J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-23	12/15/1991	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-23	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-23	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-39-23	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-39-35	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-35	12/15/1991	PCE	2.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-39-35	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-40-26	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-40-26	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-40-26	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-40-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-40-40	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-40-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-27	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-27	12/15/1991	1,2-tDCE	4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-27	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-41-27	12/15/1991	PCE	82		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-27	12/15/1991	PCE	120		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-27	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-27	12/15/1991	TCE	4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-27	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-41-45	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-45	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-41-45	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-4-19	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-4-19	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-4-19	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-42-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-42-24	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-42-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-42-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-42-40	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-42-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-43-24	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-43-24	12/15/1991	PCE	33		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-43-24	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-43-34	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-43-34	12/15/1991	PCE	1060		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-43-34	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-4-40	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-4-40	12/15/1991	PCE	0.16J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-4-40	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-28	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-28	12/15/1991	1,2-tDCE	17		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-28	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-44-28	12/15/1991	PCE	6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-28	12/15/1991	PCE	13		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-28	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-28	12/15/1991	TCE	5J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-28	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-44-39	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-39	12/15/1991	PCE	12860		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-44-39	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-45-28	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-45-28	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-45-28	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-45-38	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-45-38	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-45-38	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-47-26	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-47-26	12/15/1991	PCE	18		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-47-26	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-47-38	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-47-38	12/15/1991	PCE	30		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-47-38	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-25	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-25	12/15/1991	1,2-tDCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-25	12/15/1991	Benzene	12		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-5-25	12/15/1991	PCE	0.38J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-25	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-25	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-5-25	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-25	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-5-42.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-42.5	12/15/1991	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-5-42.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-30	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-30	12/15/1991	PCE	5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-30	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-41	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-41	12/15/1991	PCE	9.4		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-41	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-64	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-64	12/15/1991	PCE	0.6J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-6-64	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-26.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-26.5	12/15/1991	Benzene	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-7-26.5	12/15/1991	PCE	0.93J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-26.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-26.5	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-7-26.5A	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-26.5A	12/15/1991	PCE	4		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-26.5A	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-39	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-39	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-39	12/15/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-7-39	12/15/1991	PCE	8.1		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-39	12/15/1991	PCE	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-39	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-39	12/15/1991	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-7-39	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-8-28	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-28	12/15/1991	PCE	5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-28	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-35	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HC-8-35	12/15/1991	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-35	12/15/1991	Benzene	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-8-35	12/15/1991	PCE	6.8		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-35	12/15/1991	PCE	27		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-35	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-35	12/15/1991	TCE	3J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-8-35	12/15/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
HC-9-31	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-9-31	12/15/1991	PCE	175.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-9-31	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-9-36.5	12/15/1991	1,2-tDCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-9-36.5	12/15/1991	PCE	6.3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
HC-9-36.5	12/15/1991	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E7
RW1	7/12/1991	1,2-tDCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW1	7/12/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
RW1	7/12/1991	PCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW1	7/12/1991	TCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW1	7/12/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
RW2	7/12/1991	1,2-tDCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW2	7/12/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
RW2	7/12/1991	PCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW2	7/12/1991	TCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW2	7/12/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
RW3	7/12/1991	1,2-tDCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW3	7/12/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
RW3	7/12/1991	PCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW3	7/12/1991	TCE	<2	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
RW3	7/12/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S1	4/24/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S1	4/24/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S1	4/24/1992	PCE	10		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S1	4/24/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S1	4/24/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S1	9/20/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
S1	9/20/1993	DCE	0.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S1	9/20/1993	PCE	27		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S1	9/20/1993	TCE	0.6J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S1	9/20/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S10	4/28/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S10	4/28/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S10	4/28/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S10	4/28/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S10	4/28/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S10	9/22/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S10	9/22/1993	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S10	9/22/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S10	9/22/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S10	9/22/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S11	9/1/1993	Benzene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S11	9/1/1993	Toluene	0.1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S11	9/29/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S11	9/29/1993	PCE	0.3J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S11	9/29/1993	TCE	46		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S2	4/23/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S2	4/23/1992	DCE	1200		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S2	4/23/1992	PCE	880		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S2	4/23/1992	TCE	690		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S2	4/23/1992	Toluene	1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S2	10/2/1993	Benzene	0.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S2	10/2/1993	Toluene	2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S2	10/21/1993	DCE	467		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S2	10/21/1993	PCE	490		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S2	10/21/1993	TCE	280		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S3	4/29/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S3	4/29/1992	DCE	1200		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S3	4/29/1992	PCE	5400		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S3	4/29/1992	TCE	640		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S3	4/29/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
S3	9/23/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S3	9/23/1993	DCE	46J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S3	9/23/1993	PCE	380		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S3	9/23/1993	TCE	24		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S3	9/23/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S4	4/22/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S4	4/22/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S4	4/22/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S4	4/22/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S4	4/22/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S4	9/20/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S4	9/20/1993	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S4	9/20/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S4	9/20/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S4	9/20/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S5	4/23/1992	Benzene	2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S5	4/23/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S5	4/23/1992	PCE	3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S5	4/23/1992	TCE	3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S5	4/23/1992	Toluene	4		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S5	9/22/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S5	9/22/1993	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S5	9/22/1993	PCE	0.8J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S5	9/22/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S5	9/22/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S6	4/29/1992	Benzene	2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S6	4/29/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S6	4/29/1992	PCE	4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S6	4/29/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S6	4/29/1992	Toluene	3J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S6	9/29/1993	Benzene	0.4J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S6	9/29/1993	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S6	9/29/1993	PCE	0.5J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S6	9/29/1993	TCE	0.1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
S6	9/29/1993	Toluene	0.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S7	4/28/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S7	4/28/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S7	4/28/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S7	4/28/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S7	4/28/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S7	9/28/1993	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S7	9/28/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S7	9/28/1993	PCE	0.2J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S7	9/28/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S7	9/28/1993	Toluene	0.1J	J	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S8	4/24/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S8	4/24/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S8	4/24/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S8	4/24/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S8	4/24/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S8	9/28/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S8	9/28/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S8	9/28/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S8	9/28/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S8	9/28/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S9	4/22/1992	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S9	4/22/1992	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S9	4/22/1992	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S9	4/22/1992	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S9	4/22/1992	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S9	9/23/1993	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
S9	9/23/1993	DCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S9	9/23/1993	PCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S9	9/23/1993	TCE	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
S9	9/23/1993	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW01	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW01	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW02	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
STT61to66-MW02	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW03	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW03	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW04	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW04	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW05	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW05	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW06	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW06	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW07	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW07	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW08	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW08	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW09	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW09	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW10	1/10/1992	Benzene	14		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW10	1/10/1992	Toluene	3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW11	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW11	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW12	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW12	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW13	1/10/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW13	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW14	1/10/1992	Benzene	23		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW14	1/10/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW15	12/14/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW15	12/14/1992	Toluene	9		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW16	12/14/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW16	12/14/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW17	12/14/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW17	12/14/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW18	12/14/1992	Benzene	7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW18	12/14/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW19	12/14/1992	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
STT61to66-MW19	12/14/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW20	12/14/1992	Benzene	1		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
STT61to66-MW20	12/14/1992	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-23	7/1/1984	1,2-tDCE	—		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-23	7/1/1984	PCE	—		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-23	7/1/1984	TCE	37.0		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-23	1/23/1985	1,2-tDCE	11		ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	1/23/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	1/23/1985	PCE	132		ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	1/23/1985	TCE	5.8J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	1/23/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	1/23/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-23	2/12/1985	1,2-tDCE	1.9J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/12/1985	Benzene	6.5J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/12/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/12/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/12/1985	PCE	37.0		ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/12/1985	TCE	1.8J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/12/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/12/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-23	2/19/1985	1,2-tDCE	Trace	J	ug/L	State	CLW_1124 and CLW_4546 and CLW_1183
TT-23	2/19/1985	1,2-tDCE	13		ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	2/19/1985	Benzene	<10	U	ug/L	State	CLW_4546, p.10
TT-23	2/19/1985	Benzene	6.3		ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	2/19/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	2/19/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	2/19/1985	PCE	26.2		ug/L	State	CLW_1124 and CLW_4546 and CLW_1183
TT-23	2/19/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	2/19/1985	TCE	53.5		ug/L	State	CLW_1124 and CLW_4546 and CLW_1183
TT-23	2/19/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	2/19/1985	Toluene	—		ug/L		
TT-23	2/19/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	2/19/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-23	3/11/1985	1,2-tDCE	<2	U	ug/L	State	CLW_5362 and CLW_1183
TT-23	3/11/1985	1,2-tDCE	1.2J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/11/1985	Benzene	6.7J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/11/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/11/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/11/1985	PCE	14.9		ug/L	State	CLW_5362 and CLW_1183
TT-23	3/11/1985	PCE	16		ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/11/1985	TCE	<2	U	ug/L	State	CLW_5362 and CLW_1183
TT-23	3/11/1985	TCE	1.3J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/11/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/11/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	1,2-tDCE	<2	U	ug/L	State	CLW_5362 and CLW_1183
TT-23	3/12/1985	1,2-tDCE	2.8J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	Benzene	4.3J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	PCE	40.6		ug/L	State	CLW_5362 and CLW_1183
TT-23	3/12/1985	PCE	48		ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	TCE	<2	U	ug/L	State	CLW_5362 and CLW_1183
TT-23	3/12/1985	TCE	2.4J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237
TT-23	3/12/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_05237

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT-23	4/9/1985	1,2-tDCE	<2	U	ug/L	State	CLW_1426
TT-23	4/9/1985	DCE	<2	U	ug/L	State	CLW_1426
TT-23	4/9/1985	PCE	<2	U	ug/L	State	CLW_1426
TT-23	4/9/1985	TCE	< 2	U	ug/L	State	CLW_1426
TT-23	4/9/1985	VC	<2	U	ug/L	State	CLW_1426
TT-23	6/17/1985	1,2-tDCE	<2	U	ug/L	State	CLW_4806_CLW_5362
TT-23	6/17/1985	PCE	<2	U	ug/L	State	CLW_4806_CLW_5362
TT-23	6/17/1985	TCE	<2	U	ug/L	State	CLW_4806_CLW_5362
TT-23	9/25/1985	1,2-tDCE	<2	U	ug/L	State	CLW_1338
TT-23	9/25/1985	PCE	4.0		ug/L	State	CLW_1338
TT-23	9/25/1985	TCE	0.2		ug/L	State	CLW_1338
TT-23	7/11/1991	1,2-tDCE	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-23	7/11/1991	Benzene	ND	U	ug/L		
TT-23	7/11/1991	PCE	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-23	7/11/1991	TCE	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-23	7/11/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-25	7/1/1984	1,2-tDCE	—		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-25	7/1/1984	PCE	—		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-25	7/1/1984	TCE	Trace	J	ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-25	1/23/1985	1,2-tDCE	ND	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	1/23/1985	Benzene	ND	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	1/23/1985	PCE	ND	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	1/23/1985	TCE	ND	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	1/23/1985	Toluene	ND	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	1/23/1985	VC	ND	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-25	2/5/1985	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-25	2/5/1985	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-25	2/5/1985	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-25	2/5/1985	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-25	2/5/1985	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-25	4/9/1985	1,2-tDCE	< 2	U	ug/L	State	Supposed to be in CLW_1426, but page missing
TT-25	4/9/1985	PCE	< 2	U	ug/L	State	Supposed to be in CLW_1426, but page missing
TT-25	4/9/1985	TCE	< 2	U	ug/L	State	Supposed to be in CLW_1426, but page missing
TT-25	9/25/1985	1,2-tDCE	—		ug/L		
TT-25	9/25/1985	PCE	0.43		ug/L	State	CLW_1338
TT-25	9/25/1985	TCE	—		ug/L		
TT-25	10/29/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	10/29/1985	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #171_CLW_5452
TT-25	11/4/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/4/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/4/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/4/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/4/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/4/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT-25	11/4/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/4/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/4/1985	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #176_CLW_5452
TT-25	11/12/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/12/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/12/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/12/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/12/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/13/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/13/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/13/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	11/13/1985	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #180_CLW_5452
TT-25	12/2/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	12/2/1985	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #191_CLW_5452
TT-25	1/14/1986	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	1/14/1986	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'
TT-25	2/5/1986	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	2/5/1986	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'
TT-25	3/3/1986	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	3/3/1986	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'
TT-25	5/5/1986	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	5/5/1986	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'
TT-25	6/2/1986	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	6/2/1986	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	6/2/1986	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	6/2/1986	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT-25	6/2/1986	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	6/2/1986	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	6/2/1986	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	6/2/1986	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	6/2/1986	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'
TT-25	7/1/1986	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	7/1/1986	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'
TT-25	8/4/1986	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	8/4/1986	Xylenes	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'
TT-25	7/11/1991	1,2-tDCE	1.4J	J	ug/L		
TT-25	7/11/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-25	7/11/1991	PCE	23		ug/L		
TT-25	7/11/1991	TCE	5.8		ug/L		
TT-25	7/11/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-26	7/1/1984	1,2-tDCE	--		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-26	7/1/1984	PCE	--		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-26	7/1/1984	TCE	3.9		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-26	1/23/1985	1,2-tDCE	92.0		ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-26	1/23/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-26	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-26	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-26	1/23/1985	PCE	1,580		ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546
TT-26	1/23/1985	TCE	57		ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-26	1/23/1985	Toluene	ND	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-26	1/23/1985	VC	27		ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-26	2/12/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/12/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/12/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/12/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/12/1985	PCE	3.8J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/12/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/12/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/12/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565 and CLW_1183
TT-26	2/19/1985	1,2-tDCE	Trace	J	ug/L	State	CLW_1124 and CLW_4546 and CLW_1183
TT-26	2/19/1985	1,2-tDCE	9.5		ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	2/19/1985	Benzene	<10	U	ug/L	State	CLW_4546, p.10
TT-26	2/19/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	2/19/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	2/19/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	2/19/1985	PCE	55.2		ug/L	State	CLW_1124 and CLW_4546 and CLW_1183
TT-26	2/19/1985	PCE	64		ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	2/19/1985	TCE	3.9		ug/L	State	CLW_1124 and CLW_4546 and CLW_1183
TT-26	2/19/1985	TCE	4.1		ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	2/19/1985	Toluene	—		ug/L		

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT-26	2/19/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	2/19/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_4546 and CLW_1183
TT-26	4/9/1985	1,2-tDCE	1.4		ug/L	State	CLW_1426, states DCE
TT-26	4/9/1985	DCE	<2	U	ug/L	State	CLW_1426
TT-26	4/9/1985	PCE	630		ug/L	State	CLW_1426
TT-26	4/9/1985	TCE	18		ug/L	State	CLW_1426
TT-26	4/9/1985	VC	<2	U	ug/L	State	CLW_1426
TT-26	6/24/1985	1,2-tDCE	5		ug/L	State	CLW_5362_CLW_4806
TT-26	6/24/1985	PCE	1,160		ug/L	State	CLW_5362_CLW_4806
TT-26	6/24/1985	TCE	24		ug/L	State	CLW_5362_CLW_4806
TT-26	9/25/1985	1,2-tDCE	1.6		ug/L	State	CLW_1338
TT-26	9/25/1985	PCE	1,100		ug/L	State	CLW_1338
TT-26	9/25/1985	TCE	27		ug/L	State	CLW_1338
TT-26	7/11/1991	1,2-tDCE	<5	U	ug/L		
TT-26	7/11/1991	1,2-tDCE	15J	J	ug/L		
TT-26	7/11/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-26	7/11/1991	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-26	7/11/1991	PCE	340		ug/L		
TT-26	7/11/1991	PCE	360		ug/L		
TT-26	7/11/1991	TCE	56J	J	ug/L		
TT-26	7/11/1991	TCE	62J	J	ug/L		
TT-26	7/11/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-26	7/11/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-30	1/23/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	1/23/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	1/23/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	1/23/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	1/23/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	1/23/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-30	2/6/1985	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-30	2/6/1985	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-30	2/6/1985	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-30	2/6/1985	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-30	2/6/1985	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-31	7/1/1984	1,2-tDCE	—		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-31	7/1/1984	PCE	—		ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-31	7/1/1984	TCE	ND	U	ug/L	July NACIP investigation, do not see data in the report	July NACIP investigation, do not see data in the report
TT-31	1/23/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	1/23/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	1/23/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	1/23/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	1/23/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	1/23/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-31	2/6/1985	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-31	2/6/1985	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-31	2/6/1985	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT-31	2/6/1985	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-31	2/6/1985	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-52	1/23/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	1/23/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	1/23/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	1/23/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	1/23/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	1/23/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-52	2/6/1985	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-52	2/6/1985	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-52	2/6/1985	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-52	2/6/1985	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-52	2/6/1985	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-54	1/23/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	1/23/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	1/23/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	1/23/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	1/23/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	1/23/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-54	2/6/1985	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-54	2/6/1985	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-54	2/6/1985	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-54	2/6/1985	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-54	2/6/1985	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-54	7/11/1991	1,2-tDCE	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-54	7/11/1991	Benzene	1.3J	J	ug/L		
TT-54	7/11/1991	PCE	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-54	7/11/1991	TCE	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-54	7/11/1991	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-67	1/23/1985	1,2-tDCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	1/23/1985	Benzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	1/23/1985	DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	1/23/1985	Ethylbenzene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	1/23/1985	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	1/23/1985	TCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	1/23/1985	Toluene	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	1/23/1985	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #19_CLW_5570, CLW_4546, CLW_1818
TT-67	2/6/1985	1,2-tDCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-67	2/6/1985	Benzene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TT-67	2/6/1985	PCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2
TT-67	2/6/1985	TCE	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E2

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT-67	2/6/1985	Toluene	<10	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2254-MW01	7/25/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2254-MW01	7/25/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2258-MW01	7/24/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2258-MW01	7/24/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2302-MW01	7/24/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2302-MW01	7/24/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB01	6/6/1989	Benzene	13000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB01	6/6/1989	Toluene	44000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB011	6/6/1989	Benzene	<1000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB011	6/6/1989	Toluene	170000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB02	6/6/1989	Benzene	12000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB02	6/6/1989	Toluene	39000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB04	6/6/1989	Benzene	22000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-OB04	6/6/1989	Toluene	38000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-RW	6/6/1989	Benzene	5300		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2453-RW	6/6/1989	Toluene	7900		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-10	10/7/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-10	10/7/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-11	10/7/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-11	10/7/1993	Toluene	0.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-12	10/7/1993	Benzene	0.6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-12	10/7/1993	Toluene	1.1		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-13	10/20/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-13	10/20/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-14	10/20/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-14	10/20/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-15	11/22/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-15	11/22/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-16	10/20/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-16	10/20/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-3	10/7/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-3	10/7/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-4	10/20/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TTUST-2455-4	10/20/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-5	10/7/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-5	10/7/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-6	10/20/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-6	10/20/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-7	10/7/1993	Benzene	1.4		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-7	10/7/1993	Toluene	1.3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-8	10/7/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-8	10/7/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-9	10/20/1993	Benzene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2455-9	10/20/1993	Toluene	ND	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW01	10/18/1994	Benzene	4.3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW01	10/18/1994	Toluene	2.6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW02	10/18/1994	Benzene	0.8		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW02	10/18/1994	Toluene	2.3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW03	10/18/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW03	10/18/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW04	10/18/1994	Benzene	0.6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW04	10/18/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW05	10/18/1994	Benzene	1.6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW05	10/18/1994	Toluene	2.8		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW06	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW06	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW07	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW07	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW08	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW08	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW09	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW09	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW10	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW10	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW11	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW11	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW12	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TTUST-2477-MW12	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW13	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW13	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW14	11/22/1994	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2477-MW14	11/22/1994	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW03	12/30/1993	Benzene	6200		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW03	12/30/1993	Toluene	13000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW05	12/30/1993	Benzene	8800		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW05	12/30/1993	Toluene	26000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW06	12/30/1993	Benzene	1300		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW06	12/30/1993	Toluene	530		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW08	12/30/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW08	12/30/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW09	12/30/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW09	12/30/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW10	12/29/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW10	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW11	12/29/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW11	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW11D	12/30/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW11D	12/30/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW12	12/29/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW12	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW13	12/29/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW13	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW14	12/29/1993	Benzene	290		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW14	12/29/1993	Toluene	7.9		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW14D	12/30/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW14D	12/30/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW15	12/30/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW15	12/30/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW16	12/29/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW16	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW17	12/29/1993	Benzene	11		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TTUST-2478-MW17	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW17D	12/29/1993	Benzene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW17D	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW18	12/29/1993	Benzene	33		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW18	12/29/1993	Toluene	<0.5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW19	12/29/1993	Benzene	18		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW19	12/29/1993	Toluene	2.9		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW20	9/19/2000	Benzene	13		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW20	9/19/2000	Toluene	2580		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW21D	9/19/2000	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW21D	9/19/2000	Toluene	0.62		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW22	9/19/2000	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW22	9/19/2000	Toluene	11.3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW23	9/19/2000	Benzene	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW23	9/19/2000	Toluene	<5	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW24	9/19/2000	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW24	9/19/2000	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW25	9/19/2000	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2478-MW25	9/19/2000	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2634-MW01	11/29/2001	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-2634-MW01	11/29/2001	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3140-MW01	7/24/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3140-MW01	7/24/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3165-MW01	7/24/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3165-MW01	7/24/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3233-MW01	7/24/2002	Benzene	4		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3233-MW01	7/24/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3524-MW01	7/25/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3524-MW01	7/25/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3546-MW01	7/25/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-3546-MW01	7/25/2002	Toluene	2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-44-MW01	11/15/2001	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-44-MW01	11/15/2001	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-44-MW02	11/15/2001	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9

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COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TTUST-44-MW02	11/15/2001	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-44-MW03	11/15/2001	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-44-MW03	11/15/2001	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-729-MW01	7/27/2002	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-729-MW01	7/27/2002	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-1	12/19/1994	Benzene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-1	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-10	12/19/1994	Benzene	0.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-10	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-13	12/19/1994	Benzene	1		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-13	12/19/1994	Toluene	1.2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-14	12/19/1994	Benzene	0.8		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-14	12/19/1994	Toluene	0.6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-15	12/19/1994	Benzene	0.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-15	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-16	12/19/1994	Benzene	32.5		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-16	12/19/1994	Toluene	58.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-2	12/19/1994	Benzene	0.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-2	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-3	12/19/1994	Benzene	0.8		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-3	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-4	12/19/1994	Benzene	0.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-4	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-5	12/19/1994	Benzene	0.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-5	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-6	12/19/1994	Benzene	11.1		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-6	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-7	12/19/1994	Benzene	0.8		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-7	12/19/1994	Toluene	0.6		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-8	12/19/1994	Benzene	0.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-8	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-9	12/19/1994	Benzene	1.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
TTUST-TTSC-9	12/19/1994	Toluene	<1	U	ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
X24B4	9/25/1985	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5

Table E-1

COC Concentrations -Tarawa Terrace Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
X24B4	9/25/1985	PCE	2.2		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
X24B4	9/25/1985	TCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
X24B5	9/25/1985	Benzene	2.3		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
X24B5	9/25/1985	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
X24B5	9/25/1985	PCE	4.9		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
X24B5	9/25/1985	TCE	0.98		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
X24B5	9/25/1985	Toluene	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E9
X24B6	9/25/1985	DCE	—		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
X24B6	9/25/1985	PCE	12000		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5
X24B6	9/25/1985	TCE	2.7		ug/L		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E5

ND - Not detected

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	4/19/1982	TTHM				Grainger	CLW_05183
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	5/28/1982	TTHM				Grainger	CLW_05183
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	6/24/1982	TTHM				Grainger	CLW_05183
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	7/28/1982	TTHM				Grainger	CLW_05183
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	11/29/1982	TTHM				Grainger	CLW_05183
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	2/25/1983	TTHM				Grainger	CLW_05183
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	5/27/1983	TTHM				Grainger	CLW_05183
TT	Multiple locations in distribution system- Bldg STT-39A, Water Plant @ 1st Pump. Bldg TT-60, TT Elem School 1, Main Hall Men's Head Sink. Bldg TT-48, TT Elem School II, Men's Head Across Office. Bldg TT-2453, TT Exchange gas Station's Ladies Room. Bldg TT-35, Sewage Plant's Office Sink.	8/26/1983	TTHM				Grainger	CLW_05183
TT WTP	Building TT-2453, TT Exchange gas Station's Ladies Room (Sample 86)	5/28/1982	PCE	80		ug/l	Grainger	CLW_05183
TT WTP	TT WTP, Bldg STT-38, Raw (Sample 206)	7/28/1982	PCE	76		ug/l	Grainger	CLW_592_CLW_590
TT WTP	TT WTP, Bldg STT-39A, Treated (pump house that distributes water for TT) (Sample 207)	7/28/1982	PCE	82		ug/l	Grainger	CLW_592_CLW_590
TT WTP	Building TT-2453, TT Exchange gas Station's Ladies Room (Sample 168)	7/28/1982	PCE	104		ug/l	Grainger	CLW_05183
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	1,2-tDCE	12		ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509
TT WTP	Building TT-38	2/5/1985	1,2-tDCE	12		ug/l		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E12
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	PCE	215		ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509
TT WTP	Building TT-38	2/5/1985	PCE	80		ug/l		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E12
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	TCE	8J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509_CLW_4546
TT WTP	Building TT-38	2/5/1985	TCE	8.1		ug/l		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E12
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509
TT WTP	TT STT-39 (pump house that distributes water for TT)	2/5/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5509
TT WTP	Building TT-38	2/12/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/12/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/12/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/12/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/12/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/12/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/12/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/12/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #29_CLW_5565_CLW_4546
TT WTP	Building TT-38	2/19/1985	1,2-tDCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_1124
TT WTP	Building TT-38	2/19/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529
TT WTP	Building TT-38	2/19/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529
TT WTP	Building TT-38	2/19/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529
TT WTP	Building TT-38	2/19/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529

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Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	2/19/1985	PCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_1124
TT WTP	Building TT-38	2/19/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529
TT WTP	Building TT-38	2/19/1985	TCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_1124
TT WTP	Building TT-38	2/19/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529_CLW_4546
TT WTP	Building TT-38	2/19/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529
TT WTP	Building TT-38	2/19/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #37_CLW_5529
TT WTP	Building TT-38	3/11/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	3/11/1985	1,2-tDCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193_CLW_5362
TT WTP	Building TT-38	3/11/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	3/11/1985	DCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193_CLW_5362
TT WTP	Building TT-38	3/11/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	3/11/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	3/11/1985	PCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193_CLW_5362
TT WTP	Building TT-38	3/11/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	3/11/1985	TCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193_CLW_5362
TT WTP	Building TT-38	3/11/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	3/11/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	3/11/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	1,2-tDCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	1,2-tDCE	1.2J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	1,2-tDCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	Benzene	2.2J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	Benzene	1.6J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	DCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193, CLW_5362
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	DCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193, CLW_5362
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	PCE	6.6		ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193, CLW_5362

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	PCE	8.9J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	PCE	20		ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	PCE	21.3		ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193, CLW_5362
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	TCE	<2	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193, CLW_5362
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	TCE	1.1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	TCE	<10	U	ug/l	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_6193, CLW_5362
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Upstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Downstream of WTP reservoir after well TT-23 operated for 24 hours	3/12/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #44_CLW_5237_CLW_6193
TT WTP	Building TT-38	4/22/1985	1,1,1-TCA	4.1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484, Maslia Plaintiff Exh 9
TT WTP	Building TT-38	4/22/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484
TT WTP	Building TT-38	4/22/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484
TT WTP	Building TT-38	4/22/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484
TT WTP	Building TT-38	4/22/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484
TT WTP	Building TT-38	4/22/1985	PCE	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484, Maslia Plaintiff Exh 9
TT WTP	Building TT-38	4/22/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484
TT WTP	Building TT-38	4/22/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484
TT WTP	Building TT-38	4/22/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #65_CLW_4787, also CLW_05484
TT WTP	Building TT-38	4/23/1985	1,1,1-TCA	1.4J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787, Maslia Plaintiff Exh 9
TT WTP	Building TT-38	4/23/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/23/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/23/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/23/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/23/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/23/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/23/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/23/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
TT WTP	Building TT-38	4/29/1985	1,2-tDCE	<10	U	ug/l		JTC report #67
TT WTP	Building TT-38	4/29/1985	Benzene	<10	U	ug/l		JTC report #67
TT WTP	Building TT-38	4/29/1985	DCE	<10	U	ug/l		JTC report #67
TT WTP	Building TT-38	4/29/1985	Ethylbenzene	<10	U	ug/l		JTC report #67
TT WTP	Building TT-38	4/29/1985	PCE	3.7J	J	ug/l		JTC report #67
TT WTP	Building TT-38	4/29/1985	TCE	<10	U	ug/l		JTC report #67
TT WTP	Building TT-38	4/29/1985	Toluene	<10	U	ug/l		JTC report #67
TT WTP	Building TT-38	4/29/1985	VC	<10	U	ug/l		JTC report #67
TT WTP	Building TT-38	5/15/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	5/15/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	5/15/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	5/15/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	5/15/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	5/15/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	5/15/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	5/15/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #72_CLW_5484
TT WTP	Building TT-38	7/1/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/1/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/1/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/1/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/1/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/1/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/1/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/1/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
TT WTP	Building TT-38	7/8/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/8/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/8/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/8/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/8/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/8/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/8/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/8/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
TT WTP	Building TT-38	7/15/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	7/15/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
TT WTP	Building TT-38	7/15/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
TT WTP	Building TT-38	7/15/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
TT WTP	Building TT-38	7/15/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
TT WTP	Building TT-38	7/15/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
TT WTP	Building TT-38	7/15/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
TT WTP	Building TT-38	7/15/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
TT WTP	Building TT-38	7/23/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/23/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/23/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/23/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/23/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/23/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/23/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/23/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
TT WTP	Building TT-38	7/31/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	7/31/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	7/31/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	7/31/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	7/31/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	7/31/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	7/31/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	7/31/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
TT WTP	Building TT-38	8/13/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/13/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/13/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/13/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/13/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/13/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/13/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/13/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
TT WTP	Building TT-38	8/19/1985	1,2-tDCE	<10	U	ug/l		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E12
TT WTP	Building TT-38	8/19/1985	PCE	<10	U	ug/l		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E12
TT WTP	Building TT-38	8/19/1985	TCE	<10	U	ug/l		Chapter E–Occurrence of Contaminants in Groundwater (Faye and Green, 2007-Dec).pdf Table E12
TT WTP	Building TT-38	9/10/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/10/1985	Benzene	4J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849, Maslia Plaintiff Exh 9
TT WTP	Building TT-38	9/10/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/10/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/10/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/10/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/10/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/10/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/10/1985	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
TT WTP	Building TT-38	9/16/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/16/1985	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
TT WTP	Building TT-38	9/23/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	9/23/1985	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
TT WTP	Building TT-38	10/29/1985	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	10/29/1985	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
TT WTP	Building TT-38	12/2/1985	Benzene	2J	J	ug/l		JTC report unavailable, Maslia Plaintiff Exh 9
TT WTP	Building TT-38	12/2/1985	Toluene	NA		ug/l		JTC report unavailable, Maslia Plaintiff Exh 9 has other constituents
TT WTP	Building TT-38	12/18/1985	Benzene	1J	J	ug/l		JTC report unavailable, Maslia Plaintiff Exh 9
TT WTP	Building TT-38	12/18/1985	Toluene	NA		ug/l		JTC report unavailable, Maslia Plaintiff Exh 9 has other constituents

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	1/14/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	1/14/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	1,1,1-TCA	5J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	Benzene	2J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/5/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/11/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	2/18/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/18/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	2/26/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/3/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	3/11/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/11/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	Benzene	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	3/25/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	Benzene	4J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	Toluene	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/16/1986	Xylenes	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	Benzene	3J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	Toluene	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	4/21/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	4/21/1986	Xylenes	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	Benzene	3J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/5/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	Benzene	3J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/12/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	Benzene	2J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/19/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	Benzene	3J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	5/27/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	5/27/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/2/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	Benzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/9/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	Benzene	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	6/16/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/16/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	Benzene	4J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	6/25/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	Benzene	3J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/1/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	Benzene	5J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/9/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475

Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	7/9/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	Benzene	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/14/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	Benzene	1J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/21/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	Benzene	6J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	7/28/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	Benzene	5J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475

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Table E-2

COC Concentrations -Tarawa Terrace Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
TT WTP	Building TT-38	8/4/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	Toluene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	8/4/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	1,2-tDCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	Benzene	8J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	DCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	Ethylbenzene	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	PCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	TCE	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	Toluene	3J	J	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	VC	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
TT WTP	Building TT-38	12/16/1986	Xylenes	<10	U	ug/l	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475

NA - Not analyzed

Table E-3

COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-5186	6/26/1990	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	6/26/1990	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	6/26/1990	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	6/26/1990	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	6/26/1990	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	6/26/1990	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	6/26/1990	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	6/26/1990	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	6/26/1990	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-5186	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-5186	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-557	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-557	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-557	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-557	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-557	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-557	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-557	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-558	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-558	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-558	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-558	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-558	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-558	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-558	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-584	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-584	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-584	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-584	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-584	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-584	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-584	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-585	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-585	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-585	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-585	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-585	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-585	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-585	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-585	12/11/2001	Total 1,2-DCE	NA	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-585	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-585	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-585	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-595	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-595	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-595	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-595	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-595	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-595	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-595	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-595	12/11/2001	Total 1,2-DCE	NA	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-595	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-595	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-595	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-596	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-596	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-596	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-596	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-596	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-596	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-596	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-596	12/11/2001	Total 1,2-DCE	NA	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-596	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-596	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-596	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-602	7/6/1984	1,1-DCE	< 1.3	U	ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	7/6/1984	Benzene	380		ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	7/6/1984	Ethylbenzene	8.0		ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	7/6/1984	PCE	< 1.9	U	ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	7/6/1984	TCE	< 1.4	U	ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	7/6/1984	Toluene	10		ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	7/6/1984	Trans-1,2-DCE	7.8		ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	7/6/1984	VC	< 0.9	U	ug/L	Environmental Science & Engineering, Inc.	Evaluation of Data from First Round of Verification Sample Collection and Analysis, DRAFT (ESE, 1985-Jan, p.49)
HP-602	11/30/1984	1,1-DCE	2.4J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	11/30/1984	Benzene	120		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	11/30/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	11/30/1984	PCE	24		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	11/30/1984	TCE	1,600		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	11/30/1984	Toluene	5.4J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	11/30/1984	Trans-1,2-DCE	630		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	11/30/1984	VC	18		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_4546
HP-602	12/10/1984	1,1-DCE	< 500	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/10/1984	Benzene	720		ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/10/1984	Ethylbenzene	< 500	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/10/1984	PCE	< 500	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/10/1984	TCE	540		ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/10/1984	Toluene	< 500	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/10/1984	Trans-1,2-DCE	380J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/10/1984	VC	< 500	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-602	12/13/1984	1,1-DCE	< 1	U	ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	1,1-DCE	< 50	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546
HP-602	12/13/1984	1,1-DCE	1.1		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/13/1984	Benzene	< 1.0	U	ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	Benzene	230		ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-602	12/13/1984	Benzene	320		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/13/1984	Ethylbenzene	< 2.0	U	ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	Ethylbenzene	< 50	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546
HP-602	12/13/1984	Ethylbenzene	7		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/13/1984	PCE	3.2		ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	PCE	< 50	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546
HP-602	12/13/1984	PCE	6.5		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/13/1984	TCE	300		ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	TCE	340		ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546
HP-602	12/13/1984	TCE	470		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/13/1984	Toluene	< 1.0	U	ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	Toluene	12J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546
HP-602	12/13/1984	Toluene	18		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/13/1984	Trans-1,2-DCE	110		ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	Trans-1,2-DCE	230		ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546
HP-602	12/13/1984	Trans-1,2-DCE	220		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/13/1984	VC	NA		ug/L	James R. Reed & Associates	CLW_1093
HP-602	12/13/1984	VC	< 50	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644 and CLW_1054_CLW_4546
HP-602	12/13/1984	VC	0		ug/L	Environmental Science & Engineering, Inc.	M67001_000150
HP-602	12/14/1984	1,1-DCE	< 50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	2/4/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	2/4/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	2/4/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	2/4/1985	PCE	1.5J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	2/4/1985	TCE	38		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	2/4/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	2/4/1985	Trans-1,2-DCE	74		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	2/4/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-602	11/12/1986	1,1-DCE	< 2.8	U	ug/L		
HP-602	11/12/1986	Benzene	50		ug/L		
HP-602	11/12/1986	Ethylbenzene	< 7.2	U	ug/L		
HP-602	11/12/1986	PCE	< 4.1	U	ug/L		
HP-602	11/12/1986	TCE	2.2		ug/L		
HP-602	11/12/1986	Toluene	< 6.0	U	ug/L		
HP-602	11/12/1986	Trans-1,2-DCE	14		ug/L		
HP-602	11/12/1986	VC	< 4.9	U	ug/L		
HP-602	11/12/1986	Xylenes	< 12	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-602	1/22/1991	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	1/22/1991	Benzene	17		ug/L		
HP-602	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-602	1/22/1991	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	1/22/1991	TCE	0.7J	J	ug/L		
HP-602	1/22/1991	TCE	0.7J	J	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	1/22/1991	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-602	1/22/1991	Total 1,2-DCE	12		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	1/22/1991	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	1/22/1991	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-602	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/4/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/4/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/4/1984	TCE	4.6J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/4/1984	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-603	12/10/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-603	12/10/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054

Table E-3

COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-603	12/10/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-603	12/10/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-603	12/10/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-603	12/10/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-603	12/10/1984	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-603	12/10/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-603	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-603	8/11/1988	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	8/11/1988	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-603	6/26/1990	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	6/26/1990	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	6/26/1990	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	6/26/1990	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	6/26/1990	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	6/26/1990	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	6/26/1990	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	6/26/1990	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	6/26/1990	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	1/22/1991	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	1/22/1991	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	1/22/1991	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	1/22/1991	TCE	1J	J	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	1/22/1991	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	1/22/1991	Total 1,2-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-603	1/22/1991	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	1/22/1991	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	9/20/1995	Cis-1,2-DCE	2.4		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	9/20/1995	TCE	3		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-603	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-603	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-606	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-606	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-606	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-606	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-606	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-606	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-606	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-606	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-606	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-606	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-606	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-606	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	6/26/1990	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	6/26/1990	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-607 (new)	6/26/1990	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	6/26/1990	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	6/26/1990	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	6/26/1990	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	6/26/1990	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	6/26/1990	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	6/26/1990	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-607 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-607 (new)	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-608	12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-608	12/4/1984	Benzene	3.7J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-608	12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-608	12/4/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-608	12/4/1984	TCE	110		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-608	12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-608	12/4/1984	Trans-1,2-DCE	5.4J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-608	12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054

Table E-3

COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-608	12/10/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	12/10/1984	Benzene	4.0J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	12/10/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	12/10/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	12/10/1984	TCE	13		ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	12/10/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	12/10/1984	Trans-1,2-DCE	2.4J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	12/10/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-608	2/4/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	2/4/1985	Benzene	1.6J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	2/4/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	2/4/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	2/4/1985	TCE	9J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	2/4/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	2/4/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	2/4/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-608	11/12/1986	1,1-DCE	< 2.8	U	ug/L		
HP-608	11/12/1986	Benzene	< 4.4	U	ug/L		
HP-608	11/12/1986	Ethylbenzene	< 7.2	U	ug/L		
HP-608	11/12/1986	PCE	< 4.1	U	ug/L		
HP-608	11/12/1986	TCE	66		ug/L		
HP-608	11/12/1986	Toluene	< 6.0	U	ug/L		
HP-608	11/12/1986	Trans-1,2-DCE	8.5		ug/L		
HP-608	11/12/1986	VC	< 4.9	U	ug/L		
HP-608	11/12/1986	Xylenes	< 12	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-609	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-609	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-609	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-609	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-609	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-609	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-609	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-609	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-609	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-609	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-609	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-609	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-610	2/4/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-610	2/4/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-610	2/4/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-610	2/4/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-610	2/4/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-610	2/4/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-610	2/4/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-610	2/4/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-610	10/1/1992	1,1-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-610	10/1/1992	Benzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-610	10/1/1992	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-610	10/1/1992	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-610	10/1/1992	PCE	< 1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-610	10/1/1992	TCE	37		ug/L		
HP-610	10/1/1992	Toluene	< 1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-610	10/1/1992	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-610	10/1/1992	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-610	10/1/1992	VC	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-610	10/1/1992	Xylenes	< 1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-611 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-611 (new)	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-611 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-611 (new)	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-611 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-611 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-611 (new)	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-611 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-611 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-611 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-611 (new)	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-611 (old)	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-611 (old)	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-611 (old)	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-611 (old)	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-611 (old)	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-611 (old)	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-611 (old)	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-611 (old)	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-612 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-612 (new)	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-612 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-612 (new)	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-612 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-612 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-612 (new)	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-612 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-612 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-612 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-612 (new)	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-613	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-613	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-613	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-613	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-613	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-613	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-613	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-613	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-613	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-613	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-613	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-613	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-614 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-614 (new)	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-614 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-614 (new)	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-614 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-614 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-614 (new)	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-614 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-614 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-614 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-614 (new)	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-614 (old)	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-614 (old)	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-614 (old)	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-614 (old)	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-614 (old)	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-614 (old)	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-614 (old)	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-614 (old)	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-616	8/1/1995	1,1-DCE	< 0.3	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	8/1/1995	Benzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	8/1/1995	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	8/1/1995	Ethylbenzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	8/1/1995	PCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	8/1/1995	TCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	8/1/1995	Toluene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	8/1/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	8/1/1995	Trans-1,2-DCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	8/1/1995	VC	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	8/1/1995	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-616	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	11/1/1995	1,1-DCE	< 0.3	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	11/1/1995	Benzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	11/1/1995	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	11/1/1995	Ethylbenzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	11/1/1995	PCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	11/1/1995	TCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	11/1/1995	Toluene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	11/1/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	11/1/1995	Trans-1,2-DCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	11/1/1995	VC	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	11/1/1995	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	2/1/1996	1,1-DCE	< 0.3	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	2/1/1996	Benzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	2/1/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	2/1/1996	Ethylbenzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	2/1/1996	PCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	2/1/1996	TCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	2/1/1996	Toluene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	2/1/1996	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	2/1/1996	Trans-1,2-DCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	2/1/1996	VC	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	2/1/1996	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	5/2/1996	1,1-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	5/2/1996	Benzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	5/2/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	5/2/1996	Ethylbenzene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	5/2/1996	PCE	< 0.3	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	5/2/1996	TCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	5/2/1996	Toluene	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	5/2/1996	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	5/2/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-616	5/2/1996	VC	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	5/2/1996	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	7/24/1996	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	7/24/1996	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	7/24/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	7/24/1996	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	7/24/1996	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	7/24/1996	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	7/24/1996	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	7/24/1996	Total 1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	7/24/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	7/24/1996	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	7/24/1996	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	10/2/1996	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	10/2/1996	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	10/2/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	10/2/1996	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	10/2/1996	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	10/2/1996	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	10/2/1996	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-616	10/2/1996	Total 1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	10/2/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	10/2/1996	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-616	10/2/1996	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-617 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-617 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-617 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-617 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-617 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-617 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-617 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-618 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-618 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-618 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-618 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-618 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-618 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-618 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-619 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-619 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-619 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-619 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-619 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-619 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-619 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-620	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-620	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-620	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-620	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-620	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-620	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-620	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-620	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-620	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-620	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-620	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-620	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-621 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-621 (new)	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-621 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-621 (new)	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-621 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-621 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-621 (new)	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-621 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-621 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-621 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-621 (new)	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-621 (old)	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-621 (old)	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-621 (old)	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-621 (old)	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-621 (old)	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-621 (old)	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-621 (old)	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-621 (old)	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-622	6/26/1990	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	6/26/1990	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	6/26/1990	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	6/26/1990	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	6/26/1990	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	6/26/1990	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	6/26/1990	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	6/26/1990	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	6/26/1990	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-622	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-622	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-622	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	6/26/1990	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	6/26/1990	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	6/26/1990	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	6/26/1990	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	6/26/1990	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	6/26/1990	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	6/26/1990	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	6/26/1990	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	6/26/1990	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-623	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-623	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-623	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-627 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-627 (new)	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-627 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-627 (new)	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-627 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-627 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-627 (new)	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-627 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-627 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-627 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-627 (new)	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-627 (old)	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-627 (old)	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-627 (old)	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-627 (old)	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-627 (old)	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-627 (old)	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-627 (old)	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-627 (old)	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-628	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-628	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-628	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-628	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-628	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-628	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-628	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-628	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-628	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-629 (new)	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-629 (new)	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-629 (new)	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-632	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-632	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-632	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-632	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-632	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-632	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-632	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-632	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-633	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-633	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-633	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-633	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-633	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-633	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-633	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-633	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-633	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-633	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-633	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-634	12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/4/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/4/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/4/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/4/1984	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-634	12/10/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-634	12/10/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-634	12/10/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-634	12/10/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-634	12/10/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-634	12/10/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-634	12/10/1984	Trans-1,2-DCE	2.3J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-634	12/10/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-634	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-634	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-634	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-634	1/16/1985	PCE	10		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-634	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-634	1/16/1985	Trans-1,2-DCE	700		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-634	1/16/1985	VC	6.8J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-634	11/12/1986	1,1-DCE	< 2.8	U	ug/L		
HP-634	11/12/1986	Benzene	< 4.4	U	ug/L		
HP-634	11/12/1986	Ethylbenzene	< 7.2	U	ug/L		
HP-634	11/12/1986	PCE	< 4.1	U	ug/L		
HP-634	11/12/1986	TCE	< 1.9	U	ug/L		
HP-634	11/12/1986	Toluene	< 6.0	U	ug/L		
HP-634	11/12/1986	Trans-1,2-DCE	2.9		ug/L		
HP-634	11/12/1986	VC	< 4.9	U	ug/L		
HP-634	11/12/1986	Xylenes	< 12	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-634	1/22/1991	1,1-DCE	< 1.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-634	1/22/1991	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-634	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-634	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-634	1/22/1991	PCE	< 1.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-634	1/22/1991	TCE	< 1.2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-634	1/22/1991	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-634	1/22/1991	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-634	1/22/1991	Trans-1,2-DCE	< 1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-634	1/22/1991	VC	< 0.8	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-634	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-635	7/5/1984	1,1-DCE	< 1.1	U	ug/L		
HP-635	7/5/1984	Benzene	< 0.3	U	ug/L		
HP-635	7/5/1984	Ethylbenzene	< 0.9	U	ug/L		
HP-635	7/5/1984	PCE	< 1.5	U	ug/L		
HP-635	7/5/1984	TCE	< 1.2	U	ug/L		
HP-635	7/5/1984	Toluene	< 0.5	U	ug/L		
HP-635	7/5/1984	Trans-1,2-DCE	< 1.0	U	ug/L		
HP-635	7/5/1984	VC	< 0.8	U	ug/L		
HP-635	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-635	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-635	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-635	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-635	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-635	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-635	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-635	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-636	4/11/1994	1,1-DCE	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-636	4/11/1994	Benzene	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-636	4/11/1994	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-636	4/11/1994	Ethylbenzene	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-636	4/11/1994	PCE	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-636	4/11/1994	TCE	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-636	4/11/1994	Toluene	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-636	4/11/1994	Total 1,2-DCE	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-636	4/11/1994	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-636	4/11/1994	VC	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-636	4/11/1994	Xylenes	< 2	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-637	12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/4/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/4/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/4/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/4/1984	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-637	12/10/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	12/10/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	12/10/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	12/10/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	12/10/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	12/10/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	12/10/1984	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	12/10/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-637	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-637	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-637	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-637	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-637	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-637	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-637	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-637	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-637	1/22/1991	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	1/22/1991	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-637	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-637	1/22/1991	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	1/22/1991	TCE	0.90J	J	ug/L		
HP-637	1/22/1991	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-637	1/22/1991	Total 1,2-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	1/22/1991	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	1/22/1991	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-637	8/26/1992	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	8/26/1992	Cis-1,2-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	8/26/1992	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	8/26/1992	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	8/26/1992	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	8/26/1992	Trans-1,2-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-637	8/26/1992	VC	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-638	7/5/1984	1,1-DCE	< 1.1	U	ug/L		
HP-638	7/5/1984	Benzene	< 0.3	U	ug/L		
HP-638	7/5/1984	Ethylbenzene	< 0.9	U	ug/L		
HP-638	7/5/1984	PCE	< 1.5	U	ug/L		
HP-638	7/5/1984	TCE	< 1.2	U	ug/L		
HP-638	7/5/1984	Toluene	< 0.5	U	ug/L		
HP-638	7/5/1984	Trans-1,2-DCE	< 1.2	U	ug/L		
HP-638	7/5/1984	VC	< 0.8	U	ug/L		
HP-638	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-638	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-638	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-638	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-638	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-638	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-638	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-638	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (new)	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (new)	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (NEW)	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-639 (NEW)	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (new)	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (NEW)	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (New)	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639 (old)	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-639(NEW)	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-640	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-640	9/20/195	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-640	9/20/195	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-640	9/20/195	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-640	9/20/195	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-641	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-641	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-641	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-641	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-641	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-641	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-641	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-641	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/4/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/4/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/4/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/4/1984	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632_CLW_1054
HP-642	12/10/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	12/10/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	12/10/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	12/10/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	12/10/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	12/10/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	12/10/1984	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	12/10/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644 and CLW_1054
HP-642	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-642	8/11/1988	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	8/11/1988	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #88-357_CLW_1796
HP-642	1/22/1991	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	1/22/1991	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-642	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-642	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-642	1/22/1991	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	1/22/1991	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	1/22/1991	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-642	1/22/1991	Total 1,2-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	1/22/1991	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	1/22/1991	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-642	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-642	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-642	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-642	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-642	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-643	1/16/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	1/16/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	1/16/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	1/16/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	1/16/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	1/16/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-643	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-643	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	1/16/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	1/16/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	1/16/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	1/16/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	1/16/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	1/16/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-644	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-645	2/4/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-645	2/4/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-645	2/4/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-645	2/4/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-645	2/4/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-645	2/4/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-645	2/4/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-645	11/4/1986	Benzene	20		ug/L		CLW0000005011
HP-646	1/16/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	1/16/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	1/16/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	1/16/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	1/16/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	1/16/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	2/1/1996	1,1-DCE	< 0.3	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	2/1/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	2/1/1996	PCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	2/1/1996	TCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	2/1/1996	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	2/1/1996	Trans-1,2-DCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	2/1/1996	VC	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	5/2/1996	1,1-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	5/2/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	5/2/1996	PCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	5/2/1996	TCE	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	5/2/1996	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	5/2/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	5/2/1996	VC	< 0.1	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	7/24/1996	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	7/24/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	7/24/1996	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	7/24/1996	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	7/24/1996	Total 1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	7/24/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	7/24/1996	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	10/2/1996	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-646	10/2/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	10/2/1996	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	10/2/1996	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	10/2/1996	Total 1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	10/2/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	10/2/1996	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-646	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-651	1/16/1985	1,1-DCE	187		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	1/16/1985	PCE	386		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	1/16/1985	TCE	3,200		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	1/16/1985	Trans-1,2-DCE	3,400		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	1/16/1985	VC	655		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-651	2/4/1985	1,1-DCE	< 200	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	1,1-DCE	187		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-651	2/4/1985	Benzene	< 200	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	Ethylbenzene	< 200	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	PCE	397		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	PCE	400		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	TCE	17,600		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	TCE	18,900		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	Toluene	< 200	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	Trans-1,2-DCE	8,070		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	Trans-1,2-DCE	7,580		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	VC	179J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/4/1985	VC	168J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237_CLW_4546
HP-651	2/7/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	2/7/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	2/7/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	2/7/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	2/7/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	2/7/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	2/7/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-651	2/7/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	11/12/1986	1,1-DCE	7		ug/L		
HP-651	11/12/1986	Benzene	< 4.4	U	ug/L		
HP-651	11/12/1986	Ethylbenzene	< 7.2	U	ug/L		
HP-651	11/12/1986	PCE	45		ug/L		
HP-651	11/12/1986	TCE	32		ug/L		
HP-651	11/12/1986	Toluene	< 6.0	U	ug/L		
HP-651	11/12/1986	Trans-1,2-DCE	140		ug/L		
HP-651	11/12/1986	VC	140		ug/L		
HP-651	11/12/1986	Xylenes	< 12	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	1/22/1991	1,1-DCE	2.0J	J	ug/L		
HP-651	1/22/1991	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	1/22/1991	Benzene			ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-651	1/22/1991	PCE	53		ug/L		
HP-651	1/22/1991	TCE	13		ug/L		
HP-651	1/22/1991	Toluene	0.9J	J	ug/L		
HP-651	1/22/1991	Total 1,2-DCE	75		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-651	1/22/1991	VC	70		ug/L		
HP-651	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	1/16/1985	TCE	9J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-652	11/12/1986	1,1-DCE	< 2.8	U	ug/L		
HP-652	11/12/1986	Benzene	< 1.0	U	ug/L		
HP-652	11/12/1986	Ethylbenzene	< 7.2	U	ug/L		
HP-652	11/12/1986	PCE	< 3.0	U	ug/L		
HP-652	11/12/1986	TCE	< 3.0	U	ug/L		
HP-652	11/12/1986	Toluene	< 6.0	U	ug/L		
HP-652	11/12/1986	Trans-1,2-DCE	< 1.6	U	ug/L		
HP-652	11/12/1986	VC	< 1.0	U	ug/L		
HP-652	11/12/1986	Xylenes	< 12	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	1/22/1991	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	1/22/1991	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	1/22/1991	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	1/22/1991	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	1/22/1991	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	1/22/1991	Total 1,2-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	1/22/1991	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-652	1/22/1991	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-652	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-652	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-653	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	1/16/1985	TCE	5.5J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-653	11/12/1986	1,1-DCE	< 2.8	U	ug/L		
HP-653	11/12/1986	Benzene	< 4.4	U	ug/L		
HP-653	11/12/1986	Ethylbenzene	< 7.2	U	ug/L		
HP-653	11/12/1986	PCE	< 4.1	U	ug/L		
HP-653	11/12/1986	TCE	2.6		ug/L		
HP-653	11/12/1986	Toluene	< 6.0	U	ug/L		

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-653	11/12/1986	Trans-1,2-DCE	< 1.6	U	ug/L		
HP-653	11/12/1986	VC	< 4.9	U	ug/L		
HP-653	11/12/1986	Xylenes	< 12	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-653	1/22/1991	1,1-DCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-653	1/22/1991	Benzene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-653	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-653	1/22/1991	Ethylbenzene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-653	1/22/1991	PCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-653	1/22/1991	TCE	< 5.0	U	ug/L		
HP-653	1/22/1991	Toluene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-653	1/22/1991	Total 1,2-DCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-653	1/22/1991	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-653	1/22/1991	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-653	1/22/1991	Xylenes	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-654	2/4/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	2/4/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	2/4/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	2/4/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	2/4/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	2/4/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	2/4/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	2/4/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_5237
HP-654	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-654	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-654	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-654	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-654	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-654	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-654	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-654	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-654	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-654	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-654	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-655	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-655	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-655	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-655	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-655	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-655	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-655	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-655	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/4/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/4/1984	PCE	5.0J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/4/1984	TCE	210		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/4/1984	Trans-1,2-DCE	88		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632
HP-660	12/10/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	12/10/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	12/10/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	12/10/1984	PCE	4.4J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	12/10/1984	TCE	230		ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	12/10/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	12/10/1984	Trans-1,2-DCE	99		ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	12/10/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_5644_CLW_1054
HP-660	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	1/16/1985	TCE	26		ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	1/16/1985	Trans-1,2-DCE	8.8J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
HP-660	11/12/1986	1,1-DCE	< 2.8	U	ug/L		
HP-660	11/12/1986	Benzene	< 4.4	U	ug/L		
HP-660	11/12/1986	Ethylbenzene	< 7.2	U	ug/L		
HP-660	11/12/1986	PCE	< 4.1	U	ug/L		
HP-660	11/12/1986	TCE	< 1.9	U	ug/L		
HP-660	11/12/1986	Toluene	< 6.0	U	ug/L		
HP-660	11/12/1986	Trans-1,2-DCE	< 1.6	U	ug/L		
HP-660	11/12/1986	VC	< 4.9	U	ug/L		
HP-660	11/12/1986	Xylenes	< 12	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-660	1/22/1991	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-660	1/22/1991	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-660	1/22/1991	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-660	1/22/1991	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-660	1/22/1991	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-660	1/22/1991	TCE	1.0J	J	ug/L		
HP-660	1/22/1991	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-660	1/22/1991	Total 1,2-DCE	2J	J	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-660	1/22/1991	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-660	1/22/1991	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-660	1/22/1991	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	9/20/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-661	9/20/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	9/20/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	9/20/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-661	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-661	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-662	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-662	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-662	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-662	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-662	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-662	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-662	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-662	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-662	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-662	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-662	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	9/20/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-663	9/20/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	9/20/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	9/20/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	9/20/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	9/20/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	9/20/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-663	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-663	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-709	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-709	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-709	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-709	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-709	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-709	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-709	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-709	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-709	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	7/31/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	7/31/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	7/31/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	7/31/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	7/31/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	7/31/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	7/31/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	7/31/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_5102
HP-710	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-710	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-710	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-711	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-711	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
HP-711	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4007	1/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	1/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	1/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	1/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	1/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	1/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	1/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #17_CLW_5594_CLW_4512_CLW_1818_CLW_2408
LCH-4007	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4007	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4007	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4007	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4007	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4007	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4007	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4007	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4007	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4007	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
LCH-4007	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	9/19/1995	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	9/19/1995	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	9/19/1995	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	9/19/1995	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	9/19/1995	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	9/19/1995	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	9/19/1995	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	9/19/1995	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	9/19/1995	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	9/19/1995	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	12/11/2001	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	12/11/2001	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	12/11/2001	Cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	12/11/2001	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	12/11/2001	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	12/11/2001	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	12/11/2001	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
LCH-4009	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	12/11/2001	Trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	12/11/2001	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C7
LCH-4009	12/11/2001	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C8
HP-557	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-557	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-557	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-557	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-558	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-558	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-558	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-558	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-584	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-584	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-584	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-584	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-617 (new)	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-617 (new)	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-617 (new)	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-617 (new)	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-618 (new)	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-618 (new)	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-618 (new)	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-618 (new)	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-619 (new)	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-619 (new)	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-619 (new)	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-619 (new)	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	1/16/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	1/16/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	1/16/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	1/16/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-643	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	1/16/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	1/16/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	1/16/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	1/16/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-644	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-644	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/4/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/4/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/4/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/4/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	11/6/1986	Benzene	20		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	11/6/1986	Ethylbenzene	ND		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	11/6/1986	Toluene	7.5		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	11/6/1986	Xylenes	ND		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/17/1987	Benzene	290		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/17/1987	Ethylbenzene	38		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/17/1987	Toluene	15		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-645	2/17/1987	Xylenes	36		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	1/16/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	1/16/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	1/16/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	1/16/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	2/1/1996	Benzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	2/1/1996	Ethylbenzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	2/1/1996	Toluene	< 0.20	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	2/1/1996	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	5/2/1996	Benzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	5/2/1996	Ethylbenzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	5/2/1996	Toluene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	5/2/1996	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	7/24/1996	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	7/24/1996	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	7/24/1996	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	7/24/1996	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	10/2/1996	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	10/2/1996	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	10/2/1996	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	10/2/1996	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-646	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-646	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	1/16/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	1/16/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	1/16/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	1/16/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	1/16/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	1/16/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	1/16/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	1/16/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	1/16/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	1/16/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	8/1/1995	1,1-DCE	< 0.30	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	8/1/1995	Benzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	8/1/1995	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	8/1/1995	Ethylbenzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	8/1/1995	PCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	8/1/1995	TCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	8/1/1995	Toluene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	8/1/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	8/1/1995	Trans-1,2-DCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	8/1/1995	VC	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	8/1/1995	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	11/1/1995	1,1-DCE	< 0.30	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	11/1/1995	Benzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	11/1/1995	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	11/1/1995	Ethylbenzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	11/1/1995	PCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	11/1/1995	TCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	11/1/1995	Toluene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	11/1/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	11/1/1995	Trans-1,2-DCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	11/1/1995	VC	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	11/1/1995	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-647	2/1/1996	1,1-DCE	< 0.30	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	2/1/1996	Benzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	2/1/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	2/1/1996	Ethylbenzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	2/1/1996	PCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	2/1/1996	TCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	2/1/1996	Toluene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	2/1/1996	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	2/1/1996	Trans-1,2-DCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	2/1/1996	VC	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	2/1/1996	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	5/2/1996	1,1-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	5/2/1996	Benzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	5/2/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	5/2/1996	Ethylbenzene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	5/2/1996	PCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	5/2/1996	TCE	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	5/2/1996	Toluene	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	5/2/1996	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	5/2/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	5/2/1996	VC	< 0.10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	5/2/1996	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	7/24/1996	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	7/24/1996	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	7/24/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	7/24/1996	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	7/24/1996	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	7/24/1996	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	7/24/1996	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	7/24/1996	Total 1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	7/24/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	7/24/1996	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	7/24/1996	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	10/2/1996	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	10/2/1996	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-647	10/2/1996	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	10/2/1996	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	10/2/1996	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	10/2/1996	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	10/2/1996	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	10/2/1996	Total 1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	10/2/1996	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	10/2/1996	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	10/2/1996	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-647	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-647	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-648	1/16/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	1/16/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-648	1/16/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	1/16/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-648	1/16/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	1/16/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	1/16/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-648	1/16/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	1/16/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	1/16/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-648	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-648	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-648	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-648	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-648	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-649	2/4/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-649	2/4/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-649	2/4/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-649	2/4/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-649	2/4/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-649	2/4/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-649	2/4/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-649	2/4/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-649	2/4/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-649	2/4/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-649	2/4/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	1/16/1985	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	1/16/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	1/16/1985	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	1/16/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	1/16/1985	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	1/16/1985	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	1/16/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	1/16/1985	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	1/16/1985	Trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	1/16/1985	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	1/16/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-650	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-650	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-650	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-698	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-698	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-699	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-699	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-699	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-700	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-700	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-700	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	6/26/1990	1,1-DCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	6/26/1990	Benzene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	6/26/1990	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	6/26/1990	Ethylbenzene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	6/26/1990	PCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	6/26/1990	TCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	6/26/1990	Toluene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	6/26/1990	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	6/26/1990	Xylenes	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-701	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-701	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-703	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-704	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-704	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	9/21/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	9/21/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	9/21/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	9/21/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	9/21/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	9/21/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-705	9/21/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	9/21/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	9/21/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	9/21/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	9/21/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-705	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-705	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-706	9/19/1995	Benzene	0.6		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-706	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-706	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-706	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-706	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-706	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-706	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	1/13/1998	Benzene	6.1		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	1/13/1998	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	1/13/1998	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-706	1/13/1998	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-707	6/26/1990	1,1-DCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-707	6/26/1990	Benzene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-707	6/26/1990	Cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-707	6/26/1990	Ethylbenzene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-707	6/26/1990	PCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-707	6/26/1990	TCE	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-707	6/26/1990	Toluene	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-707	6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-707	6/26/1990	Trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-707	6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-707	6/26/1990	Xylenes	< 5.0	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	9/19/1995	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	9/19/1995	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	9/19/1995	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	9/19/1995	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	12/11/2001	Benzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	12/11/2001	Ethylbenzene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	12/11/2001	Toluene	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-708	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-708	12/11/2001	Xylenes	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C10
HP-703	9/19/1995	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	9/19/1995	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	9/19/1995	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	9/19/1995	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	9/19/1995	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	9/19/1995	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

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COC Concentrations - Hadnot Point Wells

Site Name	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP-703	9/19/1995	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	12/11/2001	1,1-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	12/11/2001	Cis-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	12/11/2001	PCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	12/11/2001	TCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	12/11/2001	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	12/11/2001	Trans-1,2-DCE	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9
HP-703	12/11/2001	VC	< 0.50	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C9

* Sampling result for TCE from 1/16/1985 for well HP-634 (1,300 ug/L) is not included in this table, as value is dismissed.
NA: Not analyzed
ND: Not detected

Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP	Multiple locations in distribution system	10/21/1980	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_00436
HP	Multiple locations in distribution system	12/18/1980	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_00438
HP	Multiple locations in distribution system	1/29/1981	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_00441
HP	Multiple locations in distribution system	2/26/1981	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_00443
HP	Multiple locations in distribution system	4/14/1981	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_00444
HP	Multiple locations in distribution system	6/11/1981	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_00446
HP	Multiple locations in distribution system	7/22/1981	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_05743
HP	Multiple locations in distribution system	8/21/1981	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_05739
HP	Multiple locations in distribution system	9/25/1981	TTHM				U.S. Army Environmental Hygiene Agency ("USAEHA") at Fort McPherson	CLW_05736
HP	Multiple locations in distribution system	4/22/1982	TTHM				Grainger	CLW_00543_CLW_05183
HP	Multiple locations in distribution system	5/27/1982	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	6/25/1982	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	7/28/1982	TTHM				Grainger	CLW_05183_CLW_00596
HP	Multiple locations in distribution system	11/26/1982	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	2/25/1983	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	5/27/1983	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	8/26/1983	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	12/30/1983	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	3/25/1984	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	6/27/1984	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	9/21/1984	TTHM				Grainger	CLW_05183
HP	Multiple locations in distribution system	Aug. 1982	TTHM				Grainger	CLW_00615
HP WTP	Building NH-1, Emergency Room Sink	5/27/1982	PCE	15		ug/L	Grainger	CLW_00592_CLW_05183
HP WTP	Building NH-1, Emergency Room Sink	5/27/1982	TCE	1,400		ug/L	Grainger	CLW_00592_CLW_05183
HP WTP	HP WTP, Bldg 20(Man-hole)Raw	7/27/1982	PCE	< 1.0	U	ug/L	Grainger	CLW_00592_CLW_00590
HP WTP	HB WTP, Bldg 20, Treated	7/27/1982	PCE	< 1.0	U	ug/L	Grainger	CLW_00592_CLW_00590
HP WTP	HP WTP, Bldg 20(Man-hole)Raw	7/27/1982	TCE	19		ug/L	Grainger	CLW_00592_CLW_00590
HP WTP	HB WTP, Bldg 20, Treated	7/27/1982	TCE	21		ug/L	Grainger	CLW_00592_CLW_00590
HP WTP	Bldg FC-530, Laundry Room Sink, 1st floor	7/28/1982	PCE	1		ug/L	Grainger	CLW_00592_CLW_05183
HP WTP	Bldg FC-530, Laundry Room Sink, 1st floor	7/28/1982	TCE	--		ug/L	Grainger	CLW00592_CLW_05183
HP WTP		12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	PCE	3.9J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	TCE	200		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	TCE	46		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	trans-1,2-DCE	83		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	trans-1,2-DCE	15		ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/4/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #4_CLW_5632, CLW_04546
HP WTP		12/10/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/10/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/10/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/10/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/10/1984	TCE	2.3J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/10/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/10/1984	trans-1,2-DCE	2.3J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/10/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #7_CLW_05644_CLW_01054
HP WTP		12/13/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/13/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/13/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/13/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/13/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/13/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/13/1984	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/13/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #8_CLW_5644_CLW_4546_CLW_1054
HP WTP		12/14/1984	1,1-DCE	< 20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/14/1984	Benzene	< 20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/14/1984	Ethylbenzene	< 20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/14/1984	PCE	<20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/14/1984	TCE	< 20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/14/1984	Toluene	< 20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/14/1984	trans-1,2-DCE	<20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/14/1984	VC	< 20	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/15/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/15/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/15/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546

Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		12/15/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/15/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/15/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/15/1984	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/15/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/16/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/17/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #10_CLW_05658_CLW_01054_CLW_04546
HP WTP		12/18/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/18/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/18/1984	cis-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/18/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/18/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/18/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/18/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/18/1984	Total 1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/18/1984	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/18/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP	Building FC-540	12/19/1984	1,1-DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP	Building FC-540	12/19/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	cis-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP	Building FC-540	12/19/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP	Building FC-540	12/19/1984	PCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP	Building FC-540	12/19/1984	TCE	1.2J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP	Building FC-540	12/19/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	Total 1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/19/1984	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP	Building FC-540	12/19/1984	trans-1,2-DCE	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		12/19/1984	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP	Building FC-540	12/19/1984	VC	<10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #12_CLW_05664_CLW_1054
HP WTP		1/31/1985	TCE	900		ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_05371
HP WTP		1/31/1985	trans-1,2-DCE	321.3		ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW_05371
HP WTP		2/5/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/5/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/5/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/5/1985	PCE	7.5J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/5/1985	TCE	429		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/5/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/5/1985	trans-1,2-DCE	150		ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/5/1985	VC	2.9J	J	ug/L	JTC Environmental Consultants, Inc.	JTC Report #26_CLW_05509_CLW_04546
HP WTP		2/7/1985	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		2/7/1985	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP	Building #20 finished water	2/7/1985	TCE	16.8		ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516
HP WTP	Building #20 filter effluent #1	2/7/1985	TCE	< 2.0	U	ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516

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Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP	Building #20 filter effluent #2	2/7/1985	TCE	3.4J	J	ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516
HP WTP	Building #20 influent	2/7/1985	TCE	< 2.0	U	ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516
HP WTP		2/7/1985	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP	Building #20 finished water	2/7/1985	trans-1,2-DCE	5.3		ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516
HP WTP	Building #20 filter effluent #1	2/7/1985	trans-1,2-DCE	< 2.0	U	ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516
HP WTP	Building #20 filter effluent #2	2/7/1985	trans-1,2-DCE	< 2.0	U	ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516
HP WTP	Building #20 influent	2/7/1985	trans-1,2-DCE	< 2.0	U	ug/L	NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES DIVISION OF HEALTH SERVICES OCCUPATIONAL HEALTH LABORATORY	CLW5369 and CLW4516
HP WTP		2/7/1985	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		4/24/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		4/24/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		4/24/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		4/24/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		4/24/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		4/24/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		4/24/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		4/24/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #66_CLW_4787
HP WTP		6/18/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP		6/18/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP		6/18/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP		6/18/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP		6/18/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP		6/18/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP		6/18/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP		6/18/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #84_CLW_05146
HP WTP	FC-530	6/20/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP	FC-530	6/20/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP	FC-530	6/20/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP	FC-530	6/20/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP	FC-530	6/20/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP	FC-530	6/20/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP	FC-530	6/20/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP	FC-530	6/20/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #85_CLW_05146
HP WTP		6/24/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		6/24/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		6/24/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		6/24/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		6/24/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		6/24/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		6/24/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		6/24/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #86_CLW_05146
HP WTP		7/1/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/1/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/1/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/1/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/1/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/1/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/1/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/1/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #92_CLW_5478
HP WTP		7/8/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/8/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/8/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/8/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/8/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/8/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/8/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/8/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #97_CLW_5131
HP WTP		7/15/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
HP WTP		7/15/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
HP WTP		7/15/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
HP WTP		7/15/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
HP WTP		7/15/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
HP WTP		7/15/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
HP WTP		7/15/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283
HP WTP		7/15/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #99_CLW_1283

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Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		7/23/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/23/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/23/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/23/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/23/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/23/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/23/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/23/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #101_CLW_5892
HP WTP		7/31/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		7/31/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		7/31/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		7/31/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		7/31/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		7/31/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		7/31/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		7/31/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #108_CLW_05102
HP WTP		8/13/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		8/13/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		8/13/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		8/13/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		8/13/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		8/13/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		8/13/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		8/13/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #113_CLW_5868
HP WTP		9/10/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/10/1985	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #138_CLW_5849
HP WTP		9/16/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/16/1985	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #141_CLW_5849
HP WTP		9/23/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		9/23/1985	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #149_CLW_5839
HP WTP		10/29/1985	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		10/29/1985	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #172_CLW_5452
HP WTP		11/19/1985	Benzene	2,500		ug/L	Maslia, Plaintiff Exh 9, Notes not representative, but no lab report to understand why. Periodic reading of benzene thought to be a quality control problem in sampling/analysis. Sampling of each active well in HP done last week by NREAD and BMO (I don't see these anywhere).	Maslia, Plaintiff Exh 9, Notes not representative, but no lab report to understand why. Periodic reading of benzene thought to be a quality control problem in sampling/analysis. Sampling of each active well in HP done last week by NREAD and BMO (I don't see these anywhere).
HP WTP		11/19/1985	Toluene	100		ug/L	Maslia, Plaintiff Exh 9	Maslia, Plaintiff Exh 9, Notes not representative, but no lab report to understand why. Periodic reading of benzene thought to be a quality control problem in sampling/analysis. Sampling of each active well in HP done last week by NREAD and BMO.
HP WTP		12/10/1985	Benzene	38		ug/L	Maslia, Plaintiff Exh 9	Maslia, Plaintiff Exh 9
HP WTP		12/10/1985	Toluene	10		ug/L	Maslia, Plaintiff Exh 9	Maslia, Plaintiff Exh 9
HP WTP		12/18/1985	Benzene	1.0		ug/L	Maslia, Plaintiff Exh 9	Maslia, Plaintiff Exh 9
HP WTP		12/18/1985	Toluene	NA		ug/L	Maslia, Plaintiff Exh 9	Maslia, Plaintiff Exh 9
HP WTP		1/14/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		1/14/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		1/14/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		1/14/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		1/14/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		1/14/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		1/14/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475

Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		1/14/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		1/14/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #218_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/5/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #226_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/11/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #229_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/18/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #231_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		2/26/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #237_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/3/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #243_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/11/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #251_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/16/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #253_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		3/25/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #261_'JTC_Reports_1986'_CLW_1475
HP WTP		4/3/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/3/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537

Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		4/7/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/7/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #265_CLW_06537
HP WTP		4/16/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/16/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #273_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		4/21/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #275_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/5/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #286_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/12/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #289_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/19/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #298_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		5/27/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #302_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/2/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #308_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/9/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #316_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475

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Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		6/16/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/16/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #320_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		6/25/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #333_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/1/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #341_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/9/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #345_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/14/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #346_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/21/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #353_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		7/28/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #358_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		8/4/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #363_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	1,1-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	Benzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	Ethylbenzene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	PCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	TCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	Toluene	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	trans-1,2-DCE	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	VC	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/16/1986	Xylenes	< 10	U	ug/L	JTC Environmental Consultants, Inc.	JTC Report #493_'JTC_Reports_1986'_CLW_1475
HP WTP		12/23/1987	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/23/1987	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		12/23/1987	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11

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COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		12/23/1987	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		12/23/1987	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/23/1987	TCE	0.20		ug/L		
HP WTP		12/23/1987	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		12/23/1987	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/23/1987	trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/23/1987	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		12/23/1987	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		1/11/1988	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		1/11/1988	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		1/11/1988	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		1/11/1988	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		1/11/1988	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		1/11/1988	trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		1/11/1988	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		3/2/1988	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		3/2/1988	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		3/2/1988	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		3/2/1988	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/11/1988	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/11/1988	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/11/1988	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/11/1988	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/11/1988	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/11/1988	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/11/1988	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/11/1988	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/11/1988	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/11/1988	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/11/1988	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/11/1988	1,1-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/11/1988	Benzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/11/1988	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/11/1988	Ethylbenzene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/11/1988	PCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11

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COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		8/11/1988	TCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/11/1988	Toluene	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/11/1988	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/11/1988	trans-1,2-DCE	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/11/1988	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/11/1988	Xylenes	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		9/15/1988	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		9/15/1988	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		9/15/1988	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		9/15/1988	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		9/15/1988	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		9/15/1988	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		9/15/1988	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		9/15/1988	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		9/15/1988	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		9/15/1988	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		9/15/1988	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/9/1989	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/9/1989	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/9/1989	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/9/1989	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/9/1989	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/9/1989	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/9/1989	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/9/1989	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/9/1989	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/9/1989	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/9/1989	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/8/1989	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/8/1989	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/8/1989	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/8/1989	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/8/1989	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/8/1989	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/8/1989	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/8/1989	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/8/1989	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/8/1989	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/8/1989	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/6/1989	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/6/1989	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/6/1989	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11

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COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		11/6/1989	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/6/1989	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/6/1989	TCE	0.9		ug/L		
HP WTP		11/6/1989	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/6/1989	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/6/1989	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/6/1989	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/6/1989	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	1,1-DCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	Benzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	Ethylbenzene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	PCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	TCE	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	Toluene	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	VC	< 10	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		6/26/1990	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		6/26/1990	Xylenes	< 5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		2/13/1991	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		2/13/1991	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		2/13/1991	cis-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		2/13/1991	Ethylbenzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		2/13/1991	PCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		2/13/1991	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		2/13/1991	Toluene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		2/13/1991	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		2/13/1991	trans-1,2-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		2/13/1991	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		2/13/1991	Xylenes	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/20/1991	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11

Table E-4

COC Concentrations Hadnot Point Water Treatment Plant

Site Name	Sample Location	Sample Date	Analyte	Value	Qualifier	Unit	Lab	Source
HP WTP		5/20/1991	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/20/1991	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/20/1991	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/20/1991	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/20/1991	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/20/1991	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		5/20/1991	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/20/1991	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/20/1991	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		5/20/1991	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/5/1991	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/5/1991	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/5/1991	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/5/1991	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/5/1991	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/5/1991	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/5/1991	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		8/5/1991	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/5/1991	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/5/1991	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		8/5/1991	Xylenes	0.73		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/4/1991	1,1-DCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/4/1991	Benzene	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/4/1991	cis-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/4/1991	Ethylbenzene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/4/1991	PCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/4/1991	TCE	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/4/1991	Toluene	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12
HP WTP		11/4/1991	Total 1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/4/1991	trans-1,2-DCE	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/4/1991	VC	< 0.5	U	ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C11
HP WTP		11/4/1991	Xylenes	NA		ug/L		Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C12

NA: Not analyzed

Table E-5

COC Concentrations - Holcomb Boulevard Water Treatment Plant

Sample Location	Sample Date	Analyte	Result	Units	Source
2212 Paradise Point	1/29/1985	TCE	1041	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
2212 Paradise Point	1/29/1985	trans-1,2-DCE	NA	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, reservoir	1/29/1985	TCE	8.2	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, reservoir	1/29/1985	trans-1,2-DCE	NA	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, upstream of reservoir	1/29/1985	TCE	340	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, upstream of reservoir	1/29/1985	trans-1,2-DCE	NA	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
2212 Paradise Point, cold water	1/31/1985	TCE	725	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
2212 Paradise Point, cold water	1/31/1985	trans-1,2-DCE	249	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
2212 Paradise Point, hot water	1/31/1985	TCE	613	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
2212 Paradise Point, hot water	1/31/1985	trans-1,2-DCE	201	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Tank S-2323	1/31/1985	TCE	407	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Tank S-2323	1/31/1985	trans-1,2-DCE	159	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Hydrant near 2204 Paradise Point	1/31/1985	TCE	840	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Hydrant near 2204 Paradise Point	1/31/1985	trans-1,2-DCE	308	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
2600 Paradise Point	1/31/1985	TCE	891	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
2600 Paradise Point	1/31/1985	trans-1,2-DCE	332	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Hydrant near Tank S830	1/31/1985	TCE	849	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Hydrant near Tank S830	1/31/1985	trans-1,2-DCE	340	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
5677 Berkeley Manor	1/31/1985	TCE	981	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
5677 Berkeley Manor	1/31/1985	trans-1,2-DCE	369	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
5531 Berkeley Manor	1/31/1985	TCE	906	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
5531 Berkeley Manor	1/31/1985	trans-1,2-DCE	335	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Tank SLCH 4004	1/31/1985	TCE	318	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Tank SLCH 4004	1/31/1985	trans-1,2-DCE	108	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, top of reservoir	1/31/1985	TCE	27	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, top of reservoir	1/31/1985	trans-1,2-DCE	7.6	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, bottom of reservoir	1/31/1985	TCE	24	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, bottom of reservoir	1/31/1985	trans-1,2-DCE	7.4	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, middle of reservoir	1/31/1985	TCE	26	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670, middle of reservoir	1/31/1985	trans-1,2-DCE	7.8	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20	1/31/1985	TCE	900	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13

Table E-5

COC Concentrations - Holcomb Boulevard Water Treatment Plant

Sample Location	Sample Date	Analyte	Result	Units	Source
Building #20	1/31/1985	trans-1,2-DCE	321	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #5400, Berkeley Manor School	1/31/1985	TCE	1148	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #5400, Berkeley Manor School	1/31/1985	trans-1,2-DCE	407	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20	2/5/1985	TCE	429	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20	2/5/1985	trans-1,2-DCE	150	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 finished water	2/7/1985	TCE	17	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 finished water	2/7/1985	trans-1,2-DCE	5.3	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 filter effluent #1	2/7/1985	TCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 filter effluent #1	2/7/1985	trans-1,2-DCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 filter effluent #2	2/7/1985	TCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 filter effluent #2	2/7/1985	trans-1,2-DCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 influent	2/7/1985	TCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #20 influent	2/7/1985	trans-1,2-DCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 finished water reservoir	2/7/1985	TCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 finished water reservoir	2/7/1985	trans-1,2-DCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 filter effluent #1	2/7/1985	TCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 filter effluent #1	2/7/1985	trans-1,2-DCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 filter effluent #2	2/7/1985	TCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 filter effluent #2	2/7/1985	trans-1,2-DCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 influent	2/7/1985	TCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #670 influent	2/7/1985	trans-1,2-DCE	< 2.0	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Hydrant near 2204 Paradise Point	2/7/1985	TCE	32	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Hydrant near 2204 Paradise Point	2/7/1985	trans-1,2-DCE	9	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #5400, Berkeley Manor School	2/7/1985	TCE	135	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13
Building #5400, Berkeley Manor School	2/7/1985	trans-1,2-DCE	45	ug/L	Chapter C-Occurrence of Selected Contaminants in Groundwater at IRPs (Faye, et al., 2010-Oct).pdf Table C13

NA - Not analyzed

EXHIBIT 3

U.S. Department of Justice

Civil Division, Torts Branch
Environmental Tort Litigation

Haroon Anwar, Trial Attorney
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VIA EMAIL April 21, 2025

Laura J. Baughman
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Re: ***Camp Lejeune Water Litigation***
Documents related to Drs. Hennet and Spiliotopoulos

Counsel:

I am writing in response to your April 16, 2025, letter regarding certain materials requested by document subpoenas accompanying the deposition notices directed to the United States' Phase I experts, Drs. Remy Hennet and Alex Spilitopoulous. I am also writing to follow-up about the status of outstanding materials that have yet to be produced from Mr. Maslia and Dr. Konikow.

SSPA Billing Records Related to CLJA

The United States disagrees that Plaintiffs are "entitled to billing records that identify the number of hours each testifying expert worked each day and describe the work that was performed, to the extent these records exist." Fed. R. Civ. P. 26(a)(2)(vi) & 26(b)(4)(C)(i) require the production of "a statement of the compensation to be paid for the study and testimony in the case" and communications that "relate to compensation for the expert's study or testimony." District courts within the Fourth Circuit have interpreted these provisions narrowly. *See*, *e.g.*, *Norman v. Leonard's Express, Inc.*, 2023 WL 3244002 at *6 (W.D. Va. May 4, 2023) ("Dispositively, it lists the hourly rates for Dr. Richmond's services. Because Rule 26 requires a statement of the compensation 'to be paid' to an expert—as opposed to the amount 'paid to date'—and the compensation disclosure is necessarily to be made at the time the expert's report is disclosed—as opposed to at the time of trial—the defendants have satisfied Rule 26 by producing to Norman the fee schedule.") (internal citations omitted); *Seaman v. Duke University*, 2018 WL 1441267, at *8 (M.D. N.C. Mar. 21, 2018) ("Here, based on the above authority, the Court finds Plaintiff's first two requests—for the total amount Analysis Group has billed in connection with this case and a breakdown of the proportion of Analysis Group's bills that are attributed to Dr. Cremieux's work—are sufficiently narrow and consistent with the Rule's intent."); *Océ North America, Inc. v. MCS Services*, 2011 WL 13217472, at *8 (D. Md. Sept. 9, 2011) ("To the extent it has not done so already, Océ should produce for each of its named experts a statement of the total compensation paid for their 'study and testimony in the case.' The court finds, however, that DeFazio has not articulated a compelling need for production of every monthly invoice or other document describing or concerning fees. Disclosure of Océ's experts' total compensation will adequately enable defendants to explore the experts' financial interest in this case on cross-examination.").

Here, the United States has more than complied with Fed. R. Civ. P. 26(a)(2)(vi) & 26(b)(4)(C)(i) and Fourth Circuit case law interpreting these provisions. Specifically, the United States has produced (1) information about the hourly rates of Drs. Hennet and Spilitopoulous and (2) invoices that reflect total compensation paid to S.S. Papadopulos & Associates related to work performed by or at the direction of Drs. Hennet and Spilitopoulous in the CLJA litigation. The produced invoices identify the employee type or title of each SSPA billing professional, including Dr. Hennet as "Senior Principal" and Dr. Spilitopoulous as "Senior Hydrologist." However, to avoid an unnecessary discovery dispute, the United States is working to gather and produce more detailed, timekeeping records related to the invoices already produced.

<u>SSPA Billing Records Related to Past Camp Lejeune Litigation</u>

The United States disagrees with Plaintiffs' characterization of the United States' objections to producing "compensation records related to work performed by SSPA for DOJ prior to August 2022." The specific document requests at issue in Plaintiffs' subpoena were overly broad, unduly burdensome, and sought documents and information not proportional to the needs of the case. Specifically, Request No. 6 sought "[a]ll bills, invoices, or other documents relating to payments from the United States or any of its agencies to you, S.S. Papadopulos, or any principals or agents of S.S. Papadopulos relating in any way to Camp Lejeune water contamination, the CLJA litigation, remediation related to Camp Lejeune or any other water quality issues related to Camp Lejeune from 2004 through the present." Request No. 7 sought "[a]ll timekeeping and billing records related to time that you, S.S. Papadopulos, or any principals or agents of S.S. Papadopulos spent working on any projects related to Camp Lejeune and the CLJA litigation from the time you or your employer first were retained, hired or contracted." These Requests sought extensive documentation over a 20-year period dating back to 2005 related to past Camp Lejeune litigation involving distinct and separate issues.

Fed. R. Civ. P. 26(a)(2)(B)(vi) requires a retained testifying expert to disclose "a statement of the compensation to be paid for the study and testimony *in the case*," and district courts within the Fourth Circuit have interpreted this provision narrowly. Plaintiffs cite *Burris v. Ethicon, Inc.*, 2019 WL 13185497 (S.D. W.V. Nov. 7, 2019). In that case, the district court required production of "*basic documentation* reflecting the expert's income from acting as an expert witness [in prior related litigation]." *Id*. at *1 (emphasis added). Likewise, in *Bilenky v. Ryobi Ltd.*, the district court limited production of past expert compensation "to Mr. Nielsen's expert-related income earned on behalf of Husqvarna *during the last three years*." 2014 WL 12591078, at *4 (E.D. Va. Oct. 22, 2014) (emphasis added). To avoid an unnecessary discovery dispute, the United States is working to determine if and to what extent compensation information or documents still exist related to SSPA's work for DOJ in past Camp Lejeune litigation. The United States will supplement its production with "basic" compensation information or documents related to SSPA's work for DOJ in past Camp Lejeune litigation to the extent it exists.

2005 ATSDR Expert Panel Notes

The United States disagrees that "Dr. Spiliotopoulos's notes, memoranda and any related documents regarding his attendance at the 2005 ATSDR Expert Panel meeting are not protected work product and must be produced." The work product doctrine protects "(1) documents or tangible things; (2) prepared in anticipation of litigation or trial; and (3) by or for the party or the party's representative." *U.S. v. Bertie Ambulance Service, Inc.*, 2015 WL 3932167, at *3 (E.D. N.C. June 15, 2015) (Jones, J.); *see also* Fed R. Civ. P. 26(b)(3)(A) ("Ordinarily, a party may not discover documents and tangible things that are prepared in anticipation of litigation or trial by or for another party or its representative… ."). Fed. R, Civ. P. 26(b)(4)(B) extends the work product doctrine to draft reports of retained experts. To overcome the work product protection, the discovering party must show that it "has substantial need for the materials to prepare its case and cannot, without undue hardship, obtain their substantial equivalent by other means." Fed. R. Civ. P. 26(b)(3)(A)(ii).

As you know, Dr. Spiliotopoulos testified that "In 2005 Gordon Bennet and Remy Hennet asked me to attend the meeting…and provide them with information about that." Spiliotopoulos Dep., 115:18-21. Furthermore, Dr. Hennet testified that "In 2005 I was involved in work for the Department of Justice on issues at Camp LeJeune that it had nothing to do with this case. It was a different case or different cases. And that's what I recall." Hennet Dep., 29:17-21. Contrary to Plaintiffs' assertion that "Dr. Spiliotopoulos had not been retained as an expert at that time…," Drs. Spiliotopoulos' and Hennet's testimony in this case make clear that Dr. Spiliotopoulos was working with, and under the direction of, the United States' retained experts at that time in anticipation of litigation. The United States has identified multiple prior cases in which Dr. Hennet went on to submit declarations or expert reports. Accordingly, the United States maintains that any notes taken by Dr. Spiliotopoulos in attending the 2005 ATSDR Expert Panel are protected by the work product doctrine. *Deangelis v. Corzine*, 2016 WL 93862 at *4 (S.D. N.Y. Jan. 15, 2016) ("The CFTC's arguments as to why these documents are not drafts are unconvincing. First, its claim that 'notes, summaries, memoranda, and other materials created by an expert or the expert's assistants in connection with drafting a[n] expert report' cannot be considered 'drafts' proves too much."). Plaintiffs have failed to articulate a substantial need for these notes in light of the millions of pages of documents produced and dozens of depositions taken in the litigation.

<u>CLJA Site-Visit Notes from Dr. Spiliotopoulos</u>

The United States confirms that Dr. Spiliotopoulos searched his records and that he does not have any "interview notes" or "summaries" from his site-visit to Camp Lejeune.

<u>Morris Maslia's Supplemental Calculations & Notes</u>

During Mr. Maslia's March 14, 2025, deposition, he testified that he had performed additional calculations at some point after Dr. Konikow's rebuttal report was disclosed. Maslia Dep. (3/14/25), 38:2-42:1; 52:20-54:15. Mr. Maslia specifically testified to creating notes reflecting these calculations related to the geometric bias of ATSDR's water model for Tarawa Terrace. *Id*. The United States requested production of these notes at Mr. Maslia's deposition, but they have yet to be produced. The United States again requests production of these notes.

<u>Leonard Konikow's Invoices</u>

During Dr. Konikow's February 25, 2025, deposition, he testified that he had not yet submitted his invoice for January 2025. Konikow Dep., 66:22-67:15. The United States requested that when the invoice was completed and issued to Plaintiffs' counsel, a copy of the invoice be produced. *Id*. This invoice has yet to be produced. The United States again requests production of this invoice and any additional invoices issued since Dr. Konikow's deposition.

Very Truly Yours,

/s/ Haroon Anwar

Haroon Anwar
Trial Attorney
U.S. Department of Justice
Environmental Tort Litigation

cc: Plaintiffs' Leadership Group

EXHIBIT 4

Expert Rebuttal Report of

David Sabatini, PhD, PE, BCEE

January 14, 2025

Prepared by:

David Sabatini, PhD, PE, BCEE

Registered Professional Engineer, Oklahoma - 17121

1632 Crestmont Ave., Norman, OK 73069

Table of Contents

SECTION 1: BACKGROUND AND EXPERIENCE:

I am David Ross Boyd Professor Emeritus of civil engineering and environmental science at the University of Oklahoma (OU). I joined OU in 1989, became Associate Director of the Institute for Applied Surfactant Research in 2000, and was Founding Director of the OU WaTER Center in 2005. I was appointed the Sun Oil Company Endowed Chair in 2002, and I held this position until my retirement in 2022. I received my BS in Civil Engineering (CE) from the University of Illinois in 1981, my MS CE from Memphis State University in 1985, and my PhD from Iowa State University in 1989. In addition to my PhD, I am a registered Professional Engineer (PE) and am a Board Certified Environmental Engineer (BCEE).

Over the past four decades, my research has focused on advancing and utilizing fundamental physical-chemical concepts for drinking water treatment and groundwater remediation. As an indication of my expertise and reputation on these topics, I served as Editorial Board member of the *Journal of Water, Sanitation and Hygiene for Development* and Editor-in-Chief of the *Journal of Contaminant Hydrology*, and I have coauthored or coedited five books and over 200 refereed journal publications on these topics. For over three decades, I have taught a graduate-level course on the physical-chemical process for drinking water treatment. Further details on these and other items, including any publications I have authored in the last ten years, are in my full vitae, attached to this report as Exhibit B.

The impact of my research is demonstrated by its being cited 13,728 times with an h-index of 67 (67 of my articles have been cited more than 67 times), an i-100 index of 34 (34 of my articles have been cited more than 100 times), and an i-10 index of 202 (Google Scholar Citations: December 30, 2024). My research funding totals $12.8 M, including funding from the National Science Foundation, Environmental Protection Agency, Department of Energy, and Department of Defense.

As a further indication of the impact of my work, my awards include the following (a partial list): Life Member of the American Water Works Association (AWWA, 2022), Oklahoma Higher Education Hall of Fame – Oklahoma Higher Education Heritage Society (2020), International Service Award from U.S. National Chapter of International Association of Hydrogeologists (2017), Distinguished Alumnus Award from the University of Illinois Civil and Environmental Engineering (2012), DaVinci Fellow Award – DaVinci Institute of Oklahoma (2010), the Oklahoma Medal for Excellence from the Oklahoma Foundation for Excellence (2010), the Japanese Oil Chemist Society Lectureship Award (2006), and the National Groundwater Association Groundwater Remediation Project Award (2006). From 1997 to 1998, I was honored to be a Senior Fulbright Scholar at the Universitaet Tuebingen, Germany.

My background and experience sufficiently and uniquely qualify me to comment on the fate of contaminants in Camp Lejeune water treatment plants and distribution systems, as well as the ultimate delivery of contaminated drinking water to marines and their family members.

Section 2: Introduction

The Bell Legal Group retained me in April 2023 on behalf of the *Camp Lejeune Water Litigation* Plaintiffs. Relevant to my expert rebuttal, my expertise is in physicochemical processes impacting drinking water treatment and water quality. I am being compensated at $300 per hour for preparing this report. My rate for deposition and trial testimony is $400 per hour. I have not testified by deposition or trial in the last four years.

My methodology for assessing Dr. Hennet's Expert Report Opinions 2, 10 and 13 was to evaluate the basis of his opinions relative to losses of VOCs during water treatment, storage, and filling of water buffaloes, study the supporting documents that Hennet relies upon along with the AH Environmental Report (2004), perform calculations to help identify reasons for the disparity in estimated losses between the two studies, evaluate appropriateness of input parameters to Hennet's calculations, and assess limitations of the approaches utilized to estimate VOC losses. Based on these analyses and my professional experience and judgment, I suggest modifications to Hennet's calculations that, in my opinion, more accurately capture the losses experienced in water treatment and storage at Camp Lejeune.

My expert opinion is based on my education and experience as a civil engineer and environmental scientist and on the available data and information, which, in addition to ATSDR reports, include government documents, standard textbooks, and refereed scientific journal articles documenting scientifically accepted contaminant losses in water treatment and delivery (see Exhibit A for a list of these documents). A complete list of all materials I have considered in rendering the opinions in this rebuttal will be produced within seven days of my report's submission.

Section 3: Brief description of Hadnot Point and Tarawa Terrace water treatment plants and background on volatilization concepts pertinent to my expert rebuttal report

3.1 Hadnot Point and Tarawa Terrace Water Treatment Plants

AH Environmental (2004) and Hennet (2024) provide detailed descriptions of the Hadnot Point and Tarawa Terrace water treatment plants, which I briefly summarize below. Additional details can be found in the AH Environmental and Hennet reports. I do not address the Holcomb Boulevard water treatment plant as VOCs did not adversely impact its raw water (Maslia et al., 2013).

Figure 3-1 (AH Environmental, 2004) summarizes the Hadnot Point water treatment plant, showing the raw water reservoir, the five parallel Spiractor softening units, the recarbonation basin, the five parallel gravity filters, and the finished water reservoirs. The system was designed to process the flow of 5 MGD (million gallons per day). Not shown in Figure 3-1 is the 300,000-gallon water tower filled from the finished water reservoir. See AH Environmental (2004) (Exhibit D) and Hennet (2024) for additional details on the treatment system.

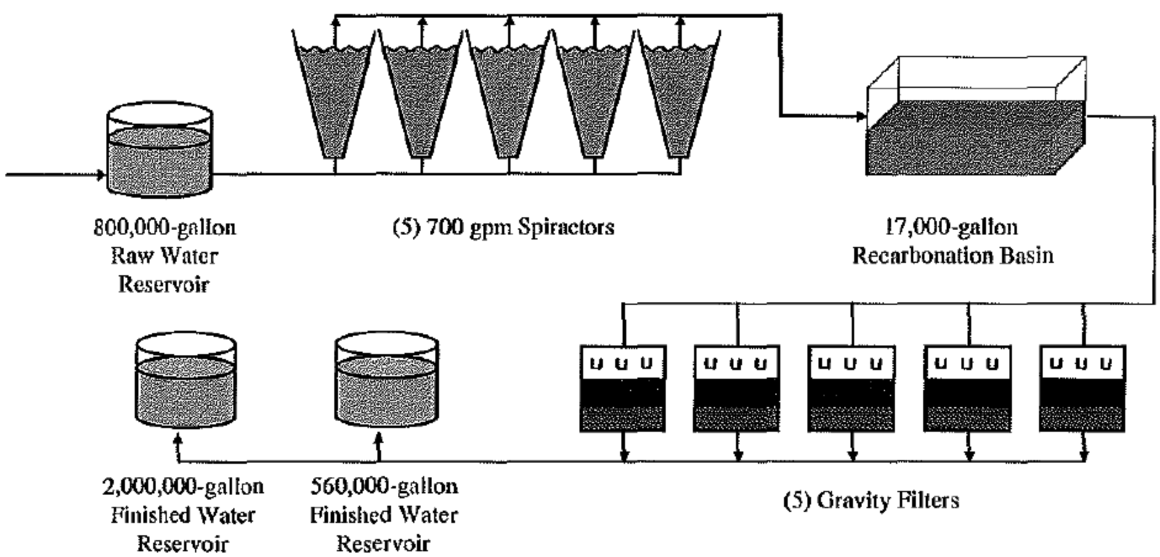

Figure 3-1 Hadnot Point Water Treatment Plant (Figure 2-3, p. 2-8, AH Environmental, 2004)

Figure 3-2 (AH Environmental, 2004) summarizes the Tarawa Terrace water treatment plant showing the Spiractor softening unit, the six parallel pressure filters, and the finished water reservoir. The system was designed to process 1 MGD of flow. Not shown in the diagram is the 250,000-gallon water tower filled from the finished water reservoir. See AH Environmental (2004) and Hennet (2024) for additional details on the treatment system.

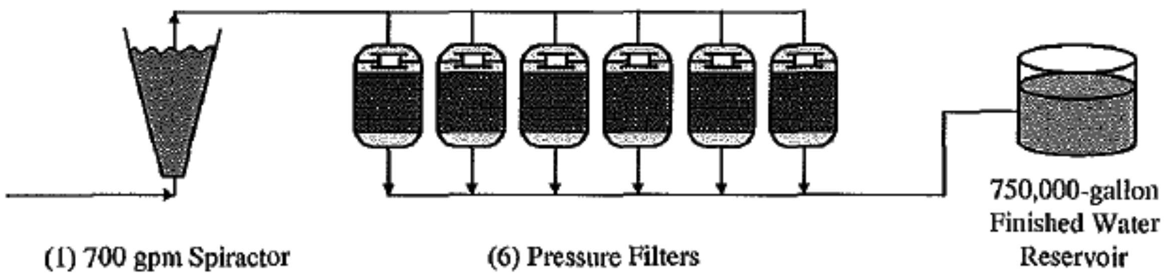

Figure 3-2 Tarawa Terrace Water Treatment Plant (Figure 2-6, p. 2-11, AH Environmental, 2004)

3.2 BACKGROUND REGARDING VOLATILIZATION LOSSES

The primary potential losses of interest in the Hadnot Point and Tarawa Terrace water treatment processes result from contaminant volatilization from the water into the air. In the Camp Lejeune case, the contaminants of concern (COCs) are the volatile organic compounds (VOCs) tetrachloroethylene (PCE), trichloroethylene (TCE), 1,2-trans-dichloroethylene (1,2-tDCE), vinyl chloride (VC) and benzene (Bz).

Equilibrium volatilization is described by Henry's Law (Schwarzenbach et al., 1993; AWWA, 1990; Crittenden et al., 2012), which indicates that the gaseous (air) concentration of a compound (C_{air}) is linearly proportional to the liquid (water) concentration of that compound (C_{water}), as shown in Equation 3-1. The proportionality constant (H) in Henry's Law (Equation 3-1) is known as Henry's Law Constant. Rearranging Equation 3-1 to Equation 3-2, Henry's constant is a compound's partitioning ratio (relative air to water concentration) at equilibrium.

$$C_{air} = H * C_{water} \qquad \text{(Equation 3-1)}$$

$$H = C_{air} / C_{water} \qquad \text{(Equation 3-2)}$$

An analogy illustrating Henry's law is the carbonation of Coca-Cola (Coke). In a Coke bottle, the CO_2 in the Coke (carbonation) is in equilibrium with the CO_2 in the air between the Coke and the lid (the headspace); this partitioning follows Henry's Law. If you remove the lid, you hear the pressurized CO_2 in the headspace escape the bottle. If you drink half of the Coke and put the lid back on, the CO_2 in the remaining Coke will eventually equilibrate with the new headspace, leading to loss of CO_2 from the Coke. This reduces the carbonation of the Coke and, in the vernacular, the Coke goes flat.

Henry's Law assumes there is sufficient time for equilibrium partitioning to be achieved. Following up on the Coke analogy, after you consume half the Coke and replace the lid, it takes time for the Coke CO_2 to come into equilibrium with the new headspace (air). If you measured the CO_2 in the air over time, you would find that it gradually increases towards the equilibrium value predicted by Henry's Law. Thus, in early time periods, the air concentration and volatilization would be much less than predicted by Henry's Law. This time-dependent (kinetic) process is a function of the driving force for volatilization (the concentration gradient between equilibrium and actual air concentration of the VOC), the area across which volatilizations is occurring, and the resistance to contaminant leaving the liquid and going into the gas phase. This process is analogous to heat flow; in the winter, heat is lost from the home in proportion to the temperature difference from inside to outside, the home's surface area, and the heat flow resistance (degree of insulation).

For volatilization, the kinetic process is described by a two-film mass transfer process (AWWA, 1990; Crittenden et al., 2012), as summarized in Equation 3-3. In this equation, J is the contaminant transfer rate (from liquid to gas in our case), K_L is the inverse resistance to contaminant flow (diffusion-controlled transfer from the water to the air), A is the area over which contaminant transfer occurs, and delta C is the concentration gradient between aqueous concentration and equilibrium gaseous concentration (the driving force). As delta C approaches zero (as we approach equilibrium), contaminant flow from liquid to air (volatilization) decreases until equilibrium is reached.

$$J = K_L \, A \, (\text{delta C}) \qquad \text{(Equation 3-3)}$$

To summarize, Henry's Law indicates the maximum volatilization that can be experienced given sufficient time to reach equilibrium (Equation 3-1). For shorter time periods, the air concentration (volatilization) may be much less than predicted by Henry's Law, depending on how quickly VOCs can migrate from the water to the air phase. In the early stages of contaminant volatilization, the air concentration and associated volatilization losses will be controlled by the area for contaminant transfer, diffusion-controlled transfer from water to air, and the driving force (difference between actual and equilibrium gaseous concentrations) as captured by the two-film transfer processes (Equation 3-3).

SECTION 4: SUMMARY OF MY OPINIONS IN RESPONSE TO HENNET'S OPINIONS 2, 10 AND 13

Based on my review and analysis of the documents discussed in this report and listed in Exhibit A, my education and experience, and my review of the scientific literature, I have reached the following opinions within reasonable scientific and engineering certainty, all of which are explained in further detail in Section 5 of this report:

4.1 Hennet (2024) overestimated VOC losses in the raw water during storage, treatment, and distribution; only minor VOC losses occurred in these systems (in response to Hennet's Opinion 2 suggesting *substantial* losses - Hennet, 2024, p. 3-1).

- *The water treatment processes at Camp Lejeune would cause only minor losses of the VOCs of interest. Assumptions in Hennet's calculations led to the overestimation of these losses. Rather than 15 to 32% losses by Hennet's calculations, I estimate < 6 to 12% losses for the range of VOCs.*

4.2 The ATSDR models indirectly accounted for VOC losses during water treatment, storage, and distribution (in response to Hennet's Opinion 10, suggesting losses not accounted for - Hennet, 2024, p. 3-3)

- *Water samples from the distribution system and homes were included in the final stage of calibration.*

4.3 Hennet (2024) overestimated VOC losses in the mobile field water tanks (water buffaloes); water concentrations in the water buffaloes were only moderately lower than in the water treatment plants' treated water. (In response to Hennet's Opinion 13, suggesting they were *substantially* lower - Hennet, 2024, p. 3-3).

- *While losses during tank filling were possible, assumptions in Hennet's calculations led to overestimates of these losses. While Hennet estimated on the order of 41% to 61% losses, I estimate no more than 15% to 22% losses for filling through filler pipe/strainer and 4.2% to 6.7% for filling through the manhole for the range of VOCs.*

I reserve the right to amend these opinions should new information be provided or become available to me.

SECTION 5: DISCUSSION OF OPINIONS

This section provides a detailed discussion substantiating the three opinions summarized in Section 4. Evidence to support my opinions is provided by referring to standard textbooks and peer-reviewed journal articles as documented in my discussion.

5.1 HENNET (2024) OVERESTIMATED VOC LOSSES IN THE RAW WATER DURING STORAGE, TREATMENT, AND DISTRIBUTION; ONLY MINOR VOC LOSSES OCCURRED IN THESE SYSTEMS. (IN RESPONSE TO HENNET'S OPINION 2, WHICH SUGGESTS SUBSTANTIAL LOSSES).

Hennet (2024) and AH Environmental (2004) each estimated VOC losses in various stages of the water treatment, storage, and distribution system, as summarized in Hennet's Exhibit 2-1 (reproduced below as Figure 5-1). This schematic represents both the Tarawa Terrace and Hadnot Point treatment systems with the variation that Tarawa Terrace did not have a raw water storage tank and Hadnot Point included a recarbonation basin between the Spiractors and the filters (see Section 3.1 for a brief summary and AH Environmental, 2004, Section 2.3 for a detailed description of the water treatment plants). The Holcomb Boulevard water treatment plant is not addressed as VOCs did not adversely impact its raw water (Maslia et al., 2013).

The main points of potential VOC losses estimated by Hennet (2024) and AH Environmental (2004) are in the treatment process (specifically the Spiractors), the raw water storage (Hadnot Point only), and the treated storage (clearwell) tanks, and the water towers. Since the Spiractor design volumes and flow rates were the same for all Spiractors in both treatment systems, the VOC loss estimate approach applies to Tarawa Terrace and Hadnot Point as discussed in the next section. Since raw water storage, clearwell, and water tower VOC losses are estimated similarly but vary by tank size and flow rate, they will be discussed in the subsequent section. I will present the VOC loss estimates from Hennet (2024) and AH Environmental (2004) along with my own conclusions based on my calculations and assessments.

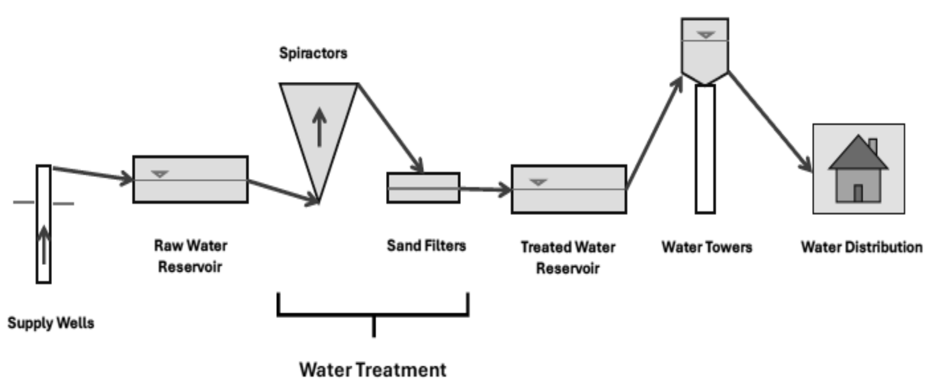

Exhibit 2-1. Flow Through Schematic for Water from Supply Wells to Distribution

Figure 5.1 Flow Schematic for Water Treatment and Distribution (Hennet, 2024, p. 5-2)

5.1.1 *Spiractors*

AH Environmental (2004) and Hennet (2024) followed the same approach for estimating VOC losses in the Spiractors, with their results summarized in Table 5.1.

Table 5.1 – Spiractor PCE and TCE volatilization losses estimated by AH Environmental (AH 2004), Hennet (2024), and corrected for AH Environmental

Source	TCE Loss (%)	PCE Loss (%)
AH Environmental (2004)*	6.1	7.7
Hennet (2024)**	10.0	12.2
AH Environmental (2004) – corrected***	5.2	6.2

*AH (2004), Sec 4.2, p. 4-1

**Hennet (2024), Exhibit 2-4, p. 5-6

***Exhibit C.1

To understand why Hennet estimated VOC losses larger than AH Environmental, I reviewed the estimation approach they used (both followed the method outlined in Nakasone (1987), summarized in AH (2004), and incorporated into WATER9 (EPA, 1994)). Upon repeating their calculations I identified two reasons for the differences in the estimated VOC losses: (1) AH Environmental transposed an exponent in their Equation 11 (AH 2004 – Exhibit D, p. 3-4) – the last term should be $h^{0.31}$ instead of $h^{0.13}$ (Nakasone, 1987), Hennet caught this error as well; and, (2) AH Environmental used a water drop in the effluent pipe of 1 ft (0.3 m) while Hennet used a fall height of 2 ft (0.6 m) (leading to fall height Z values of 0.375 m and 0.675 m, respectively).

Relative to the transposed exponent, I recalculated AH Environmental's losses using the correct exponent and listed the updated values in Table 5.1 as corrected. Implementing the correct form of the equation reduced the volatilization loss values predicted by AH (Table 5.1), thus not accounting for Hennet's higher loss values. Rather, Hennet's use of 2 ft as the water drop in the effluent pipe is the reason for his higher VOC loss estimates.

So why did Hennet choose to use 2 ft instead of AH Environmental's value of 1 ft? In Exhibit 2-3a (p. 5-5, Hennet, 2024), Hennet shows a picture of a Spiractor effluent pipe that was being replaced, although he doesn't indicate which water treatment plant this came from. In this figure, Hennet indicates a 2 ft drop from the top of the effluent pipe to the top of the pipe, carrying water away from the effluent pipe. I surmise that this is why Hennet chose to use a 2 ft (0.6 m) value. However, AH Environmental (2004) indicates that the water drop was no greater than 1 ft for Hadnot Point (AH, 2004, p. 4-2), while for Holcomb Boulevard, which did not have a recarbonation basin, the water drop could approach 2 ft. AH Environmental indicates that the recarbonation basin created a headloss (constricted the flow) such that water backed up in the Spiractor effluent pipe resulting in a 1 ft versus 2 ft water drop in the Spiractor effluent pipe for Hadnot Point. This impact can be seen visually in AH Environmental (2004) Figure 4-1 (Exhibit D – p. 4-2) for Hadnot Point and AH Environmental (2004) Figure 4-3 (Exhibit

D – p. 4-3) for Holcomb Boulevard; Figure 4-3 shows more free fall versus Figure 4-1 for Hadnot Point, justifying AH Environmental's choice of the 1 ft (0.3 m) water drop in the Spiractor effluent pipe. Hennet (2024) does not refer to AH Environmental's discussion regarding the impact of the Hadnot Point recarbonation basin on the water drop in the Spiractor effluent pipe. Further, AH Environmental's Figure 3-4 (Exhibit D – p. 3-10), which Hennet includes as his Exhibit 2-2 (Hennet, 2024, p. 5-4), shows a 12 in drop. I thus conclude that AH Environmental's use of 1 ft (0.3 m) for the water drop in the Spiractor effluent pipe is justified.

In Table 5.2, I extend AH Environmental's corrected calculations for a 1 ft (0.3 m) drop to 1,2-tDCE, VC (vinyl chloride), and Benzene (Bz) and summarize Hennet's values for a 2 ft drop for all five VOCs. In all cases, Hennet's values are almost twice that compared to AH Environmental's use of 1 ft. In my opinion, as discussed above, the AH values are more appropriate.

Table 5.2 – Spiractor VOC Loss Estimates for AH Environmental Water Drop in Effluent Pipe (1 ft), vs. Hennet (2 ft)

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
AH Environmental (1 ft)*	5.2	6.2	5.9	9.9	4.3
Hennet (2024) (2 ft)**	10.0	12.2	11.1	19.1	8.1

* Exhibit C.1

** Hennet (2024), Exhibit 2-4, p. 5-6

One final observation can be made regarding calculated VOC losses in the Spiractor effluent pipe. The Nakasone (1987) method estimates VOC losses due to water flow over a weir. A weir is a vertical barrier or wall over which water flows, cascading as a free fall onto the other side of the barrier or wall. The water flows over the barrier in a parallel path above and below the weir. In reality, the water exits the Spiractor over the circular edges of a pipe (see AH (2004) Figures 3-2 and 3-3, Exhibit D, pp. 3-8 and 3-9, respectively), so that the water flow after the "weir" is no longer parallel but converges in the center (see AH (2004) Figure 4-1, Exhibit D, p. 4-2). As the water (flow lines) converge in the center, the area for volatilization decreases. Thus, while I am not aware of a better approach than Nakasone (1987) for making this estimate, in my opinion, the estimated values of VOC losses will be conservative (higher than actually experienced). All this to say, I find this to be further justification supporting the corrected AH Environmental Spiractor volatilization losses in Table 5.2 for Hadnot Point and Tarawa Terrace. If anything, in my opinion, the actual values were lower than AH Environmental predicted rather than higher as Hennet (2024) suggests.

5.1.2 Storage Tanks (Raw Water, Treated Water/Clearwells, Water Towers)

Both AH Environmental (2004) and Hennet (2024) followed the approach outlined in Thomas (1990) for estimating VOC losses in raw water and treated water (clearwell) tanks, and water towers. Whereas AH Environmental (2004) estimated VOC losses of **0.04% or less** (AH, 2004, p. 4-4) for the tanks, Hennet estimated loss values summed across these tanks of **6 to 14%** for the range of VOCs (Hennet, 2004, Exhibits 2-4 and 2-5, pp. 5-6 to 5-10). To understand why VOC losses from Hennet were greater than AH Environmental's values, I reviewed the estimation approach as summarized in AH Environmental (2004) and referred back to the original Thomas (1990) document. Thomas (1990) compiles four different methods for estimating volatile losses from water bodies open to the atmosphere: (1) Mackay and Wolkoff, (2) Lisa and Slater, (3) Chiou and Freed, and (4) Smith et al. AH Environmental (2004) and Hennet (2024) followed the Smith et al. (1980) approach as outlined in Thomas (1990). I agree with this choice.

Given that they both followed the Smith et al. approach, why did their estimates differ so dramatically? Upon looking further into their respective calculations, AH Environmental (2004) invoked the Southworth (not Southgate as referred to by Hennet, 2024, p. 5-11, footnote 64) method for estimating volatilization rates for input to the Smith et al. approach (AH Environmental used Thomas, 1990, Equations (15-32) to (15-34) in their analysis which are AH's Equations 4 to 6, p. 3-12 to 3-13, 2004 – see Exhibit D). The Southworth technique was developed for moderately volatile compounds (10^{-5} < Henry's Constant < 10^{-3} atm-m^3/mol), while VOCs of concern to Camp Lejeune are highly volatile (> 10^{-3} atm-m^3/mol; see Thomas, 1990, Table 15-4, pp. 15-24 to 15-25). As such, the Southworth approach does not apply for VOCs of interest to Camp Lejeune which all have Henry's Constants > 10^{-3} atm-m^3/mol. Hennet (2024) correctly uses the more generalizable approach outlined in Thomas (1990), which is appropriate for VOCs of interest at Hadnot Point and Tarawa Terrace water treatment plants. This difference explains why Hennet's (2024) estimates are different, and higher, than AH Environmental. Nonetheless, in my opinion, there is much room for improvement in Hennet's calculations, and cause to assess the applicability of the Thomas approach to Camp Lejeune's raw water, clearwell, and water tower tanks.

The approaches outlined in Thomas (1990) are for systems open to the atmosphere (*e.g.*, a pond, lake, or river). In contrast, the Camp Lejeune water treatment tanks, from raw water to clearwell to water towers, are covered – they are not open to the atmosphere. A Coke bottle, with and without a lid, can demonstrate the contrast between a closed (covered) system and an open system. Relative to the Coke bottle, the carbonation in the Coke is analogous to VOCs in Camp Lejeune water. As the carbonation (CO_2) comes out of the water (Coke), it will volatilize into the atmosphere if the bottle is uncovered, causing the Coke to "go flat" or lose its carbonation. If the Coke bottle is covered (has a lid), the CO_2 leaving the Coke will come into equilibrium with the CO_2 in the air above the Coke. As more CO_2 accumulates in the air above the Coke, this slows down the rate of volatilization until CO_2 in the air and Coke come into equilibrium via Henry's Law (Henry's Constant is the ratio of the gaseous versus liquid concentration of a compound at equilibrium), at which point no more CO_2 leaves the Coke (see Section 3.2 for further discussion of these concepts). This simple analogy will help us understand the limitations of the Thomas/Smith (1990) approach, as discussed below.

My first difference with Hennet's calculations has to do with one of the parameters he uses from Thomas (1990). Hennet (2024) uses the $(k_v^c)_{env}$ value of 0.008 hr^{-1} for a pond from Thomas (1990) Table 15-3 (p. 15.20). I concur with Hennet's choice of a pond value versus a river as being more representative of water treatment tanks, but given the discussion above, in my opinion, the lowest $(k_v^c)_{env}$ value in Table 15-3 should have been used – 0.0046 hr^{-1}. This would reduce Hennet's estimates proportionally (0.0046/0.008 times his estimates or 0.58 times his estimates). Applying this to Hennet's values mentioned above (6 to 14% losses across all tanks for the range of VOCs) results in adjusted losses of **3 to 8% losses** (see Exhibit C.2 for calculations).

Further, Thomas suggests that "When one is applying the results of calculations to actual environmental situations, it would probably be advisable to assume that the values of volatilization rate may be high by a factor of ten at most and low by a smaller factor of possibly three." (Thomas, 1990, p. 15-8). Given the disparity between the covered tanks of Camp Lejuene and the assumption of reservoirs open to the atmosphere in Thomas (1990), the calculation errors would obviously be on the high side. Thus, the "high by a factor of ten" is, in my opinion, defensible given the differences between open and closed systems. Applying this to the modified range mentioned above, the new range of VOC losses becomes **0.3 to 0.8%** - closer to the range proposed by AH Environmental. In the absence of a more appropriate estimation approach (and I am not aware of one), in my opinion, this is a more reasonable estimate.

To further support this lower range of estimated volatilization losses, consider that while the Camp Lejeune water treatment tanks are open to water exchange they do not similarly experience air exchange. As new water flows into the tanks, it is exposed to air in the tank that has already been exposed to water with VOCs. This would be analogous to pumping new Coke into a bottle at the same rate Coke flows out of the bottle with a stationary air phase between the Coke and the cover (lid). The Coke is being exchanged with new carbonated Coke, but the air phase above the Coke is not being replaced with fresh air. Thus, the air eventually approaches saturation with CO_2 from the previous Coke in the bottle; as this saturation is approached, the driving force for additional CO_2 volatilization into the air decreases toward zero (see Section 3.2). In the same way, new water flowing into any storage tank is coming into contact with tank air having increasing levels of VOCs, thereby reducing the driving force for additional volatilization as new water flows into the tank. This understanding of the water treatment tanks' operational nature further supports the low volatilization across these tanks (**0.3 to 0.8% or < 1%** - see Table 5.3).

5.1.3 Other potential VOC losses (filters, recarbonation basin, solids, backwash, distribution)

Hennet refers to several other potential VOC losses (filters, recarbonation basin, solids, backwash, distribution). While not included in Hennet's overall quantified losses, the suggestion is that these additional losses could have been significant. In my opinion, these potential losses would have been minor to negligible, as discussed below.

5.1.3.1 Sand Filters and Flow-through Recarbonation Basin

Both AH Environmental (2004) and Hennet (2024) estimated that the volatilization losses in sand filters (both Tarawa Terrace and Hadnot Point) and the recarbonation basin without CO_2 bubbling (Hadnot Point) were negligible (< 0.1% when adjusting Hennet's estimation for the more appropriate $(k_v^c)_{env}$ as discussed above (see Hennet, 2004, Exhibit 2-4,

p. 5-7 for filters and recarbonation calculations). This is consistent with the flow nature in these basins (versus flow over a weir) along with their short detention times (<0.25 hrs).

5.1.3.2 Recarbonation Basin when CO_2 was bubbled up into basin

When installed in 1941/42 the Hadnot Point water treatment recarbonation basin was operational (CO_2 was bubbled up into the basin). There is no clear indication of when carbonation ceased, and the unit became a simple flow-through system (AH, 2004; Hennet, 2024). The purpose of recarbonation is to lower the system's pH towards a neutral pH by bubbling CO_2 into the bottom of the basin (think of a fish tank with an aerator bubbling air into the fish tank water). In a recarbonation basin, The CO_2 reacts with water to form carbonic acid which helps lower the pH of the water.

Hennet states that "the recarbonation of water would likely have removed most (i.e., 90% removal or more) of the dissolved COCs (VOCs) from the water. The aeration of water or air stripping is a well-proven technology to remove VOCs from water." (Hennet, 2024, p. 5-12). While I agree with Hennet's comment that air stripping is a well-proven technology for VOC removal, as demonstrated in standard water treatment textbooks (American Water Works Association - AWWA, 1990; Crittenden et al., 2012), I disagree with Hennet's suggestion of 90% removal during recarbonation. (Interestingly, Hennet does not include this in his final assessment of VOC losses - Hennet, 2024, Exhibit 2-6, p. 5-14). Recarbonation and air stripping are dramatically different processes. Air stripping involves spraying water into the top of a column (think of several shower heads pointing downwards into a column) while blowing air upwards into the bottom of the column, resulting in a very high air to water ratio (commonly A/W of 30:1 or 30 times more air than water – AWWA, 1990; Crittenden et al., 2012). This high A/W ratio greatly increases volatilization (think of pouring coke into a cake pan to increase surface area with a fan blowing air over the top to maximize volatilization). In contrast, in a recarbonation basin, the goal is for CO2 to dissolve into the water; ideally, no CO_2 makes it to the surface (think of a fish tank with an air diffuser bubbling air into the water). Functionally, a fraction of the CO_2 does make it to the surface, but the CO_2 to water ratio (at most 0.05:1 water – Mattingly, 2024) is extremely small relative to the A/W ratio in air stripping (30:1). Thus, recarbonation, with two to three orders of magnitude less A/W ratio, would be orders of magnitude less efficient than air stripping. Further, the low detention time (0.08 hrs – AH, 2004) allowed negligible time for volatilization. All of this combined with the uncertainty of how long recarbonation was implemented causes me to conclude that VOC losses would have been minor, and I agree with Hennet's decision not to include this in his overall VOC loss estimates (Hennet, 2024 - Exhibits 2-4 and 2-6, pp. 5-8, 5-9 and 5-14).

5.1.3.3 Sorption losses onto Spiractor solids

Hennet (2024) suggests that VOC losses may have occurred by sorption onto mineral solids generated in the Spiractor during the softening process (p. 5-12). Hennet points to Schwarzenbach et al. (1993) to support this claim. Generally, when we discuss VOC sorption as a removal process, we talk about sorption onto activated carbon (AWWA, 1990; Crittenden et al., 2012). In contrast, VOC sorption onto mineral surfaces is not discussed as a treatment process in these textbooks. Rather, while the American Water Works textbook (AWWA, 1990) provides a summary table of heavy metal losses onto softening mineral surfaces, it does not discuss VOC removal onto softening minerals (AWWA, 1990). Upon review of the Schwarzenbach et al. reference (1993), I note that their mention of organic removal onto mineral surfaces is directed at highly hydrophobic organic solutes (versus our slightly hydrophobic VOCs) and high surface area minerals (e.g., 100s of m^2/g – it is unlikely that Spiractor solids would approach this level). This combined with the low detention time in the Spiractor (23.08 m3 / 157.73 m3/h = 0.15 hrs – AH Environmental, 2004) versus the typical 24-hour equilibration time in sorption studies like those reported in Schwarzenbach et al. (1993) leads me to conclude that such losses would be negligible in the Camp Lejeune case. I thus concur with Hennet's decision not to include this in his overall VOC loss estimates (Hennet, 2024 - Exhibits 2-4 and 2-6, pp. 5-8, 5-9 and 5-14).

5.1.3.4 Losses in backwash water

Hennet refers to filter backwashing as a possible source of VOC loss in the Camp Lejeune treatment plants (Hennet, 2024, p. 5-13). Hennet indicates that the filters are backwashed every 48 hours. Typically, backwash is for 20-30 mins (0.33 to 0.5 hrs) with water flowing upwards at 3 to 4 times the filtration rate to cause filter bed expansion and enhance filter cleaning (AWWA, 1990; Crittenden et al., 2012). Using the longer filtration time and lower backwash rate leads to backwashing occurring for ~1% of the time (0.5 hr / 48 hours) at 3 times the rate, or backwash water accounts for roughly 3% of the treated water. Often, this water is sent to a settling basin to allow the solids to settle out of the water. After settling, the water may be returned to the plant for treatment. Some of the VOCs may be lost due to volatilization, and some of the water may be lost due to evaporation and association with the solids in the settling basins. In this case, the volatilization losses may be closer to those estimated by Hennet for tanks as the settling basins are open to the atmosphere (Hennet estimated from 1 to 10% for the various VOCs – see Section 5.1.2). Using the high end of losses to the atmosphere (10%) and assuming 100% of the backwash water is recoverable and recycled to the water treatment plant (which is 3% of the total water treated) leads to at most 10%*3% or 0.3% VOC losses of the overall treated water. I thus conclude that these losses would be minor and concur with Hennet's decision not to include this in his overall VOC loss estimates (Hennet, 2024 - Exhibits 2-4 and 2-6, pp. 5-8, 5-9 and 5-14).

5.1.3.5 Losses in the distribution system

After treatment and storage, the water is delivered to the consumer through the distribution system. Flow in the distribution is through pressurized pipes and thus not open to the atmosphere. AH Environmental (2004) and Hennet (2024) do not consider losses in the distribution system. Given that the distribution system is closed and pressurized, I likewise conclude that losses in the distribution system were negligible.

5.1.4 Summary of VOC losses in water treatment plant storage, treatment, and distribution

In Table 5.3, I summarize my conclusions regarding the likely VOC losses in the Spiractor softening basin, the closed storage tanks (raw water, clearwell, water towers), and other possible losses in the water treatment systems at Camp Lejeune. AH Environmental suggested an overall loss of <15% based on their calculations for PCE and TCE. Based on Table 5.3, I would suggest that the estimated losses for TCE, PCE, 1,2-tDCE and Bz is actually <10% with only VC slightly above this 10% level but still less than the 15 % suggested by AH Environmental. I thus conclude that AH Environmental was conservative in their estimate of less than 15% PCE/TCE losses.

In contrast, Hennet (2024) estimated higher losses than AH Environmental (Table 5.3). The reasons for Hennet's higher estimates are discussed in Sections 5.1.1 and 5.1.2, along with reasons for why my estimates deviate from Hennet's estimates. (In short, Hennet overestimated the water drop in the Spiractor and used a method that assumed tanks were open to the atmosphere). **As such, I conclude that Hennet (2024) overestimated the potential losses in the water treatment processes. The actual loss values, in my opinion, were less than 6 to 12% for the VOCs of interest versus 15% to 32% as suggested by Hennet (2024). Table 5.4 shows how these volatilization losses would reduce raw water to treated water concentrations.**

Table 5.3 – Summary of VOC Loss Estimates for Spiractor, Storage Tanks, and Other Losses for Camp Lejeune – Tarawa Terrace and Hadnot Point Water Treatment Systems

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
Spiractor (Sec 5.1.1)	5.2	6.2	5.9	9.9	4.3
Storage tanks (Sec 5.1.2)	<1	<1	<1	<1	<1
Other losses (Sec 5.1.3)	<1	<1	<1	<1	<1
My Estimate - overall losses	**<7.2**	**<8.2**	**<7.9**	**<11.9**	**<6.3**
AH Environmental (2004), p.5-1	<15	<15	-	-	-
Hennet (2024), Exhibit 2-6, p.5.14	17	18	22	32	15

Table 5.4 – VOC Concentrations in Treated Water Considering Volatilization Losses

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
VOC in Raw Water	100	100	100	100	100
VOC in Treated Water	93	92	92	88	94

5.2 THE ATSDR MODELS INDIRECTLY ACCOUNTED FOR VOC LOSSES DURING WATER TREATMENT, STORAGE, AND DISTRIBUTION (IN RESPONSE TO HENNET'S OPINION 10 THAT LOSSES WERE NOT ACCOUNTED FOR - HENNET, 2024, P. 5-36)

Hennet (2024) suggests that ATSDR considered only raw water before treatment in its system modeling approach, concluding that "concentration estimates by ATSDR are therefore not representative of the treated water and exaggerate the COC concentration in the drinking water supply." (Hennet, 2024, p. 5-37). In fact, in his expert report, Maslia points out that "The reconstructed concentrations versus the observed data in Table 7.15 (Table 5-5 in this report) demonstrate successful Level 4 calibration," indicating that treated water samples were used in the final calibration step for Hadnot Point. The footnotes in Table 5-5 indicate which samples were of untreated water, treated water, and unknown treatment status (eight fell into this last category). Of the twelve samples with known treatment status, nine were of treated water, and three were of untreated water, demonstrating that treated water and associated VOC losses in the treatment plant were well represented in the Level 4 calibration step.

Further evaluation of Table 5-5 provides insight into the fate of VOCs in the Hadnot Point water treatment plant. On three occasions, water samples were taken from the raw water entering the treatment plant and the finished water after treatment. For TCE the dates were 7/27/82 and 12/4/84, while for 1-2-tDCE the date was 12/4/84. In all three cases, the treated concentrations were similar to or higher than the raw water concentrations. While admittedly a small data set, the data do provide further support for the minor to negligible VOC losses I propose in Section 5.1 and my assertion that Hennet overestimated these losses.

Table 5-5: Summary of measured and reconstructed contaminant concentrations used in the Level 4 calibration for Hadnot Point (Maslia, 2024, Table 7.15, p. 86)

Contaminant	[1]Measured data		[2]Reconstructed (simulated)		[2]Reconstructed (maximum value)	
	Sample date	Concentration, in µg/L	Simulation date	Concentration, in µg/L	Simulation date	Concentration, in µg/L
PCE	5/27/1982[3]	15	May 1982	21	Nov. 1983	39
	7/27/1982[4]	100	July 1982	27		
	12/4/1984[6]	3.9J	Nov. 1984	31		
	2/5/1985[7]	7.5J	Jan. 1985	16		
TCE	5/27/1982[3]	1,400	May 1982	438	Nov. 1983	783
	7/27/1982[5]	19	Aug. 1982	670		
	7/27/1982[6]	21	Aug. 1982	670		
	12/4/1984[5]	46	Nov. 1984	639		
	12/4/1984[6]	200	Nov. 1984	639		
	12/12/1984[6]	2.3J	Dec. 1984	43		
	12/19/1984	1.2	Dec. 1984	43		
	2/5/1985[7]	429	Jan. 1985	324		
1,2-tDCE	12/4/1984[6]	83	Nov. 1984	358	Nov. 1983	435
	12/4/1984[5]	15	Dec. 1984	26		
	12/12/1984[6]	2.3J	Dec. 1984	26		
	2/5/1985[7]	150	Jan. 1985	163		
VC	2/5/1985[7]	2.9J	Jan. 1985	31	Nov. 1983	67
Benzene	11/19/1985[7,8,9]	2,500	Nov. 1985	3	Apr. 1984	12
	12/10/1985[7]	38	Dec. 1985	3		
	12/18/1985[7]	1.0	Dec. 1985	3		

[1] Data from Faye et al. (2010, Tables C11 and C12)

[2] Simulation results represent the last day of each month (e.g., May 31); results reported for simulation month nearest the sample date; refer to Appendix A7 for complete listing of reconstructed finished-water concentrations

[3] Water sample collected at Building NH-1; data reported as unreliable

[4] Water sample collected at Building FC-530

[5] Untreated water

[6] Treated water

[7] Treatment status unknown

[8] Laboratory analysis noted with: "Sample appears to have been contaminated with benzene, toluene, and methyl chloride" (JTC Environmental Consultants 1985)

[9] Data noted with: "Not Representative" (U.S. Marine Corp Base Camp Lejeune Water Document CLW #1356)

Likewise, for Tarawa Terrace, Maslia (2024) indicates that "The results of these computations compared to an analysis of a water sample collected at a point in time, either at the TTWTP or at a location within the TT water-distribution system such as an outdoor or indoor faucet, are summarized in Table 7.12." (Maslia, 2024, p. 58, with Table 7.12 on p. 60 of his report). Data coming from indoor or outdoor faucets would reflect treated water. Once again, the fact that Tarawa Terrace Level 4 calibration included treated water samples demonstrates that ATSDR indirectly considered losses during water treatment and distribution.

While Maslia's Table 7.12 (2024) does not identify raw versus treated water that can be compared for VOC losses across the treatment process, from CLW 606 we know that the 7/28/82 samples allow a comparison. For the 7/28/82 PCE samples, the raw water was 76 ug/l and the treated water was 82 ug/L (considering analytical error, the same), once again supporting my opinion in Section 5.1 that the treatment processes at Camp Lejeune would produce at most minor VOC losses, if any, and that Hennet (2024) overestimated these losses.

Thus, for both the Tarawa Terrace and Hadnot Point systems, treated water samples were used in the calibration process and the ATSDR did consider such losses in the treatment system.

5.3 HENNET (2024) OVERESTIMATED VOC LOSSES IN THE MOBILE FIELD WATER TANKS (WATER BUFFALOES). WATER CONCENTRATIONS IN THE WATER BUFFALOES WERE ONLY MODERATELY LOWER THAN IN THE WATER TREATMENT PLANTS' TREATED WATER. (IN RESPONSE TO HENNET'S OPINION 13, THAT THEY WERE SUBSTANTIALLY LOWER - HENNET, 2024, P. 5-39).

Hennet (2024) assesses volatilization losses during the filling of water buffaloes (mobile storage tanks) used for water provision in areas of the base not serviced by the water distribution system (*e.g.*, during training exercises). Hennet's estimates are based on water buffalo diagrams (Exhibit 13-1, p. 5-39, and Attachment C, p. C-15; Hennet, 2024) as shown in Figure 5.2 in this report. Hennet assumes that the water buffaloes were filled through the filler pipe which has a strainer through which water would flow (Figure 5.2). Hennet assumes that water flowing through the strainer would be like water coming out of a shower head, and uses the McKone and Knezovich (1991) analysis for TCE losses in a shower. In adapting this approach for losses in filling the water buffaloes, Hennet (2024) modified TCE mass transfer coefficients as per McKone and Knezovich (1991), assuming that these mass transfer rates apply until the tank is half full, at which point the filling hose becomes submerged. At this point, Hennet assumes a linear decrease in removal rate during the second half of the tank filling (see Hennet, 2024, Exhibit 13-2, p. 5-41). Using this approach, Hennet estimates VOC losses in the water buffaloes as summarized in the Rows 1 and 2 of Table 5-6.

Assuming the tank was filled through the filler pipe and strainer, an assumption addressed further below, there are fundamental differences between the shower and buffalo systems that Hennet does not address, namely time for volatilization and cross sectional area for mass transfer. Relative to time of volatilization, the shower-based VOC loss is for a 1.6 m drop from the showerhead to the bathtub (McKone and Knezovich, 1991, Table 1). As Hennet (2024) points out, the water buffaloes are 0.8 m tall (see upper table in Figure 5-2). During initial filling, the entire 0.8 m fall would be experienced. As the tank approaches full, the fall height approaches zero (in contrast, during the shower experiment, the fall height remains 1.6 m throughout and the air to water remains the same since the water drains). As such, during filling, the water buffalo would have an average fall height of 0.4 m, which is 1/4th (25%) of that in the shower experiment. Assuming that the shower and strainer produce similar spray patterns with similar downward velocities, and given that the relative time for volatilization is the fall distance divided by downward velocity, since the downward velocities are assumed to be the same, the relative time for volatilization is proportional to the relative fall heights (the velocities cancel out in the ratio). Assuming the strainer produces a similar spray pattern (cross-sectional area) to the shower, no adjustment is necessary for the mass transfer area in this case. Thus, my VOC loss estimate in Table 5-6, Row 3 is ¼ (0.4 m / 1.6 m) or 25% of what Hennet estimates in Row 1 of the same table, which I apply to filling of the tank. If the strainer produced a smaller degree of spray relative to the shower the losses would be reduced, further supporting my lower estimate compared to Hennet's.

Water Buffalo Dimensions

M107A2	model	
400	gal	volume
17.125	inches	manhole diameter
4.625	inches	filler pipe cover gasket outer diameter
3.75	inches	filler pipe cover gasket inner diameter
31.97	inches	tank height
0.81	meters	tank height
16.1	inches	strainer length
0.41	meters	strainer length

References:

ATSDR_WATERMODELING_01-0000917100 - ATSDR_WATERMODELING_01-0000917102

Department of the Army. 1964. Operator, Organizational and Field Maintenance Instructions, Including Repair Parts and Special Tools List-for: CHASSIS TRAILER: 1 1/2 TON, 2-WHEEL M103A1, M103A2, M103A3, M103A3C, M103A4, AND M103A4C TRAILER, CARGO: 1 1/2 TON, 2-WHEEL M104, M104A1, M105A1, M105A2, AND M105A2C TRAILER, TANK, WATER: 1 1/2 TON, 2-WHEEL M106, M106A1, M107A1, M107A2, AND M107A2C TRAILER, VAN, SHOP: FOLDING SIDES, 1 1/2 TON, 2-WHEEL, M448. TM 9-2330-213-14. January.

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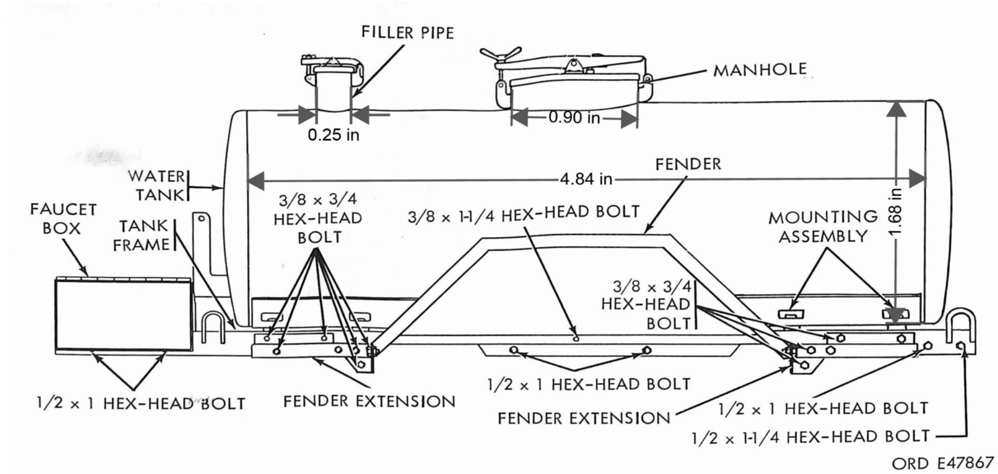

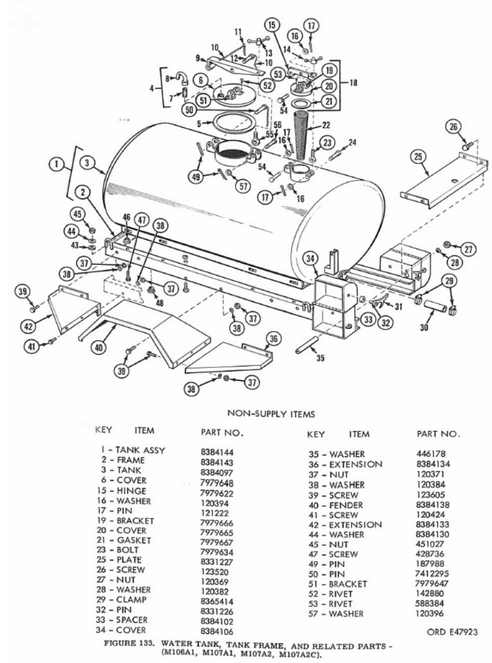

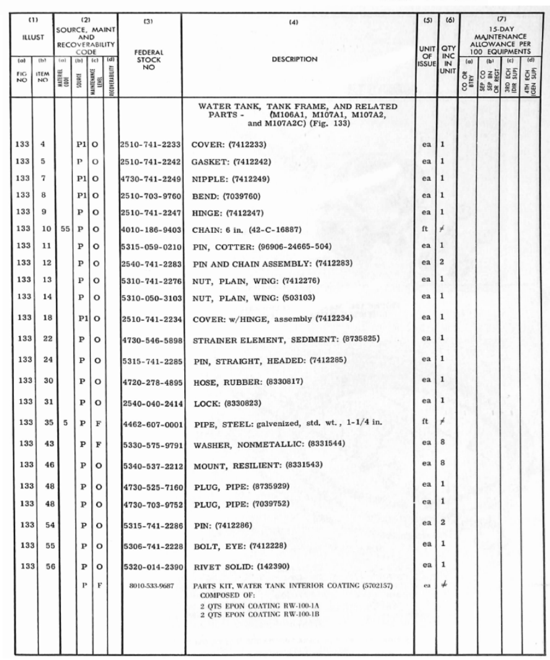

(1) ILLUST (a) FIG NO	(1) ILLUST (b) ITEM NO	(2) SOURCE, MAINT AND RECOVERABILITY CODE (a) MATERIEL CODE	(2) (b) SOURCE	(2) (c) MAINTENANCE LEVEL	(2) (d) RECOVERABILITY	(3) FEDERAL STOCK NO	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) QTY INC IN UNIT	(7) 15-DAY MAINTENANCE ALLOWANCE PER 100 EQUIPMENTS (a) CO OR BTRY	(7) (b) SEP CO SEP BN OR REGT	(7) (c) 3RD ECH (DIR SUP)	(7) (d) 4TH ECH (GEN SUP)
							WATER TANK, TANK FRAME, AND RELATED PARTS - (M106A1, M107A1, M107A2, and M107A2C) (Fig. 133)						
133	4		P1	O		2510-741-2233	COVER: (7412233)	ea	1				
133	5		P	O		2510-741-2242	GASKET: (7412242)	ea	1				
133	7		P1	O		4730-741-2249	NIPPLE: (7412249)	ea	1				
133	8		P1	O		2510-703-9760	BEND: (7039760)	ea	1				
133	9		P	O		2510-741-2247	HINGE: (7412247)	ea	1				
133	10	55	P	O		4010-186-9403	CHAIN: 6 in. (42-C-16887)	ft	≠				
133	11		P	O		5315-059-0210	PIN, COTTER: (96906-24665-504)	ea	1				
133	12		P	O		2540-741-2283	PIN AND CHAIN ASSEMBLY: (7412283)	ea	2				
133	13		P	O		5310-741-2276	NUT, PLAIN, WING: (7412276)	ea	1				
133	14		P	O		5310-050-3103	NUT, PLAIN, WING: (503103)	ea	1				
133	18		P1	O		2510-741-2234	COVER: w/HINGE, assembly (7412234)	ea	1				
133	22		P	O		4730-546-5898	STRAINER ELEMENT, SEDIMENT: (8735825)	ea	1				
133	24		P	O		5315-741-2285	PIN, STRAIGHT, HEADED: (7412285)	ea	1				
133	30		P	O		4720-278-4895	HOSE, RUBBER: (8330817)	ea	1				
133	31		P	O		2540-040-2414	LOCK: (8330823)	ea	1				
133	35	5	P	F		4462-607-0001	PIPE, STEEL: galvenized, std. wt., 1-1/4 in.	ft	≠				
133	43		P	F		5330-575-9791	WASHER, NONMETALLIC: (8331544)	ea	8				
133	46		P	O		5340-537-2212	MOUNT, RESILIENT: (8331543)	ea	8				
133	48		P	O		4730-525-7160	PLUG, PIPE: (8735929)	ea	1				
133	48		P	O		4730-703-9752	PLUG, PIPE: (7039752)	ea	1				
133	54		P	O		5315-741-2286	PIN: (7412286)	ea	2				
133	55		P	O		5306-741-2228	BOLT, EYE: (7412228)	ea	1				
133	56		P	O		5320-014-2390	RIVET SOLID: (142390)	ea	1				
			P	F		8010-533-9687	PARTS KIT, WATER TANK INTERIOR COATING (5702157) COMPOSED OF: 2 QTS EPON COATING RW-100-1A 2 QTS EPON COATING RW-100-1B	ea	≠				

Figure 5-2 – Schematic of Water Buffalo showing filler pipe (top figure) and strainer (#22 in lower figure and listed in the table) – Hennet, 2024, p. C-15. Note: Redline dimensions on Hennet's water buffalo diagram are in error, refer to upper table for dimensions.

Table 5.6 – Hennet Estimates of VOC Losses in water buffaloes based on filling through strainer using shower analysis of McKone and Knezovich (1991) (Exhibit 12-3, p. 5-41, Hennet, 2024), and my modifications to Hennet's estimates

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
(1) Hennet – Losses during filling of bottom half of water tank – based on shower losses	54	58	72	81	60
(2) Hennet – Overall loss (assumes linear decrease in loss during filling top half of tank)	41	44	54	61	45
(3) My estimate of losses during filling tank based on average fall height of 0.4 m vs 1.6 m in shower experiment, assuming downward velocities are the same (25% or 0.25 x Row 1)	14	15	18	20	15
(4) My estimate of maximum possible equilibrium losses when tank half full*	23	35	24	47	16

*Exhibit C.3

Another critique of Hennet's use of the McKone and Knezovich (1991) shower analysis is that it is based on kinetics of mass transfer (volatilization) in a shower setting where the system has much more air than water. When the water buffalo is one-half full, the air-to-water ratio is 1:1. In contrast, during the shower experiments, the shower air-to-shower water ratio was more than 12:1 (McKone and Knezovich, 1991 reported 2.3 m^3 of air versus 0.19 m^3 of water in their experiments). Even this calculated 12:1 air-to-water ratio overestimates the experimental air-to-water ratio; since the water exited through the shower drain rather than accumulating in the tub, the actual air-to-water ratio was much higher. In Table 5.6, I included a row (Row 4) of Henry's Law-based equilibrium losses of the VOCs when the tank was half full – this is the maximum that could be achieved if sufficient time were present to reach equilibrium. Looking at Table 5.6, one notes that Hennet's loss values in filling the bottom half of the tank (Row 1) exceed my equilibrium calculations (Row 4). How can kinetic-based experiments generate higher losses than equilibrium allows? This can be attributed to the fact that the shower experiments had a much higher air-to-water ratio (>12:1) than the water buffalo at half full (1:1). The shower analysis would thus be analogous to a Coke bottle with only a small amount of Coke in the bottom versus the tank analysis based on half full. Had the shower experiments been conducted at a 1:1 water ratio, the losses would have been much lower – even lower than my equilibrium predictions due to mass transfer/volatilization limitations (Section 3-2). This further supports my loss estimates in Row 3, which are all below the equilibrium loss values in Row 4.

Consider the case where water buffaloes were filled through the manhole on top of the water buffalo (Figure 5.2), which seems highly likely for reasons discussed below and in Sabatini Appendix A. For filling through the manhole, the shower-based method would further overestimate VOC removal (the flow would not go through the strainer in the filler pipe). It is not apparent why highly treated water would be put through the strainer. The strainer would more likely be used during field deployment when, in the absence of a treatment plant, the water buffaloes would be filled from a lake or river, and the strainer would remove debris. This is consistent with the presence of a hand pump feeding the filler pipe in early versions of the water buffaloes (Brigham, 2024, Exhibit 32, p. 98), which is absent in later versions of the water buffaloes (Brigham, 2024, Exhibit 35, p. 101). Brigham indicates that at Camp Lejeune, the water buffaloes were filled from standpipes (Brigham, 2024, Exhibit 36 and 37, pp. 103 and 104, respectively), which were 2-inch vertical pipes directly tapping into the water distribution system. The vertical standpipe had two 90-degree elbows and a downspout tube length allowing the water buffaloes to be filled from above (as illustrated in Figure 24 in Sabatini Appendix A, which is attached to this rebuttal report). Sautner et al. indicate that the Hadnot Point distribution system had 60 psi of pressure (Sautner et al., 2013, Figure S8.11, p. S8.16); this and the standpipe configuration are consistent with a reported fill time of two to three minutes (Sabatini Appendix A), and thus a flow rate of 150 to 200 gpm (400 gallons / 200 gallons/minute = 2.0 minutes fill time). For ease of filling and to accommodate this higher flow rate, it seems likely that the water buffaloes would be filled through the manhole (the filler pipe strainer would likely not accommodate these high flow rates). Testimonials from Camp Lejeune employees document that water buffaloes were filled through the manhole cover (Sabatini Appendix A).

Standpipe filling through the manhole cover leads to two additional deviations from Hennet's (2024) calculation. First, since the flow does not go through the strainer, the downward stream of water coming from the 2-inch standpipe/hose would have lower area for mass transfer than in the shower-based estimate. While the standpipe is 2 inches in diameter (Brigham, 2024), the water buffalo filler pipe has an inside diameter of 3.75 inches (Hennet, 2024, p. C-15, inset table – see Figure 5-2) which combined with the strainer produces a larger spray area. The diameter of a shower spray, the basis of Hennet's shower-based loss estimates, is approximately 6 to 7 inches midway between the showerhead to the floor (Sabatini, 2025). Thus, the shower-based volatilization values have at least three times the surface area (6 inches versus 2 inches) for mass transfer versus top-filling through the manhole sans the strainer, and the resulting VOC losses for manhole filling would be 1/3 (0.33 times) of Hennet's estimate relative to area for mass transfer.

Another deviation from Hennet's shower analysis is the relative time of volatilization. For the higher flow rates when filling through the manhole (standpipe flow rates of 150 to 200 gpm), and based on the cross-sectional area of a 2-inch pipe, the downward velocities when filling through the manhole would be 15 to 20 ft/sec (velocity = flow / area). In contrast, the shower-head-induced energy losses would generate lower downward velocities in the shower – approximately 10 to 13 ft/sec (Sabatini, 2025). Thus, the downward velocities in filling the water tank would be approximately 1.5 times higher during manhole filling versus in the shower/strainer system. Since the volatilization time is inversely proportional to downward velocity (time = distance / velocity), the filling time would be reduced by dividing shower results by 1.5 (or multiplying by 1/1.5 or 0.66). Thus, Hennet's VOC losses must be reduced for the lower surface area discussed above (0.333), and volatilization time (relative fall height (0.4 m/1.6m or 0.25) / relative velocities (1.5) = 0.167) in manhole filling). My estimated manhole filling losses, accounting for area of mass transfer and volatilization time, become 0.333*0.167 = 0.056 or 5.6% of Hennet's values in Table 5.6, Row 1 (see Table 5.7, Row 3 for my estimated losses).

Sabatini Appendix A indicates that water buffaloes were sometimes filled from fire hydrants, which would accommodate larger hoses and higher flow rates (at least twice my flow rates above – Sabatini Appendix A). Increasing the flow rates would decrease my loss estimates proportionally (e.g., doubling the flow rate would reduce my loss estimates in half). In this case and others, Sabatini Appendix A indicates that filling tubes were sometimes inserted into the tank, which would reduce fall height, volatilization times, and VOC losses proportionally, again reducing my estimated losses in Table 5.7, Row 3.

In addition to my estimate for losses during manhole filling (Table 5.7, Row 3 is 5.6% of Hennet's Row 1 in Table 5.6). Table 5.7 also summarizes shower-based VOC losses through filler pipe/strainer by Hennet and by myself (Row 1 and 2, respectively). The data in Table 5.7 demonstrate that necessary adjustments to the shower-based approach to more closely mimic water buffalo filling result in significantly lower VOC loss estimates than Hennet (true for both filler-pipe and manhole filling).

As one final step in the analysis, the minor losses during the filling process estimated here raise the question of what losses might have occurred in the water buffalo headspace during daily operation. We return to the Thomas (1990) approach discussed earlier for water treatment system tanks to address this question. Since the water buffalo drains and the headspace increases during the day, the Thomas approach, while not exact, is more directly applicable. Assuming that the tank is filled (full) first thing in the morning and is used from morning to evening, the operating time could be as much as 12 hours (7 AM to 7 PM). During initial use, minimal volatilization losses would have been experienced, while the maximum volatilization would have occurred after twelve hours. As such, the average volatilization losses during operation would occur at the mid-point in time – after six hours. Row 4 in Table 5.7 summarizes VOC loss estimates during water buffalo use based on this analysis (see Exhibit C.4 for details). My analysis assumes the water buffaloes were filled and used only once per day – if they were filled twice per day, my estimate would be reduced in half.

Table 5.7 provides a summary of the overall VOC losses in the water buffaloes based on Hennet's (2024) calculations and my estimates for filling the water buffaloes from the filler tank and also my analysis for filling from the manhole cover. **I thus conclude that Hennet's calculations overestimated the VOC losses during filling of the water buffaloes; he estimated 41% to 61% for the range of VOCs while I estimated much lower losses (15 to 22% through filler pipe/strainer and 4.2 to 6.7% through the manhole, including daily use not accounted for by Hennet) for the range of VOCs. I thus conclude that the water buffalo**

water was only mildly to moderately lower in VOCs, not substantially lower as Hennet (2024) states. Table 5.8 shows how these volatilization losses would impact raw water to treated water as well as treated water to water buffalo filling through filler pipe/strainer and through the manhole, both including losses during use (not accounted for in Hennet, 2024). Again, only minor to moderate losses are realized in the water buffaloes.

Table 5.7 – Summary of my estimates of VOC losses in filling water buffaloes versus Hennet's Estimates (Hennet, 2024)

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
(1) Hennet – filler pipe/strainer - Overall loss (see Table 5-6, Row 2))	41	44	54	61	45
(2) My estimate – filler pipe/strainer overall filling losses (see Table 5.6, Row 3)	14	15	18	20	15
(3) My estimate – filled by standpipe through manhole cover – 5.6% of Hennet's Row 1 values in Table 5.6	3.0	3.2	4.0	4.5	3.3
(4) My estimated losses during daily use of water buffaloes (Exhibit C.4)	1.2	1.0	1.9	2.2	1.2
(5) My estimate – overall losses – filler pipe strainer plus daily use (Row 2+4)	15	16	20	22	16
(6) My estimate – overall losses – standpipe filling through manhole plus daily use (Row 3+4)	4.2	4.2	5.9	6.7	4.5

Table 5.8 – VOC Concentrations in Treated Water and During Water Buffalo Filling / Use Considering Volatilization Losses

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
VOC in Raw Water	100	100	100	100	100
VOC in Treated Water (Table 5.4)	93	92	92	88	94
VOC in Buffalo Water – filling through filler tube/strainer and daily use (Table 5.7, Row 5)	79	77	74	69	79
VOC in Buffalo Water - standpipe filling through manhole and daily use (Table 5.7, Row 6)	89	88	87	82	90

Exhibit A

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Exhibit C.1
Calculations for Spiractor – 1 ft (0.3 m) Water Drop / Corrected Equation / All Five VOCs

Spiractors								
Chemical Properties							Spiractor Properties	
		PCE	TCE	1,2tDCE	VC	Bz		
							Tailwater (m) - h	0.15
H	atm-m3/mol)	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03	Circumference (m)	0.94
R	tm-m2/(mol-K)	8.21E-05	8.21E-05	8.21E-05	8.21E-05	8.21E-05	Flow (m^3/hr)	157.73
T	K	2.93E+02	2.93E+02	2.93E+02	2.93E+02	2.93E+02	Flow/Circumf (m^2/hr) - q	167.80
H'	dimensionless	5.44E-01	2.94E-01	3.08E-01	9.02E-01	1.81E-01	Critical Depth above weir (m)	0.05
Dw	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06		
Da	cm2/s	8.13E-02	8.90E-02	8.65E-02	1.03E-01	9.80E-02		
MW	g/mol	1.66E+02	1.31E+02	96.90	6.25E+01	7.81E+01		
(D)O2,w	cm2/s	8.99E-06	8.99E-06	8.99E-06	8.99E-06	8.99E-06		
(D)O2,a	cm2/s	9.80E-02	9.80E-02	9.80E-02	9.80E-02	9.80E-02		
Hennet								
Fall Ht (m)	3.00E-01	Z = Fall Ht + 1.5*critical depth (m)			**3.75E-01**			
Deficit Ratio (ln r - AH Eq 11 corrected	dimensionless	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01		
Liquid Mass Transfer - kL - AH Eq 10	m/s	1.20E-02	1.29E-02	1.60E-02	1.78E-02	1.34E-02		
Gas Mass Transfer - kg - AH Eq 9	m/s	4.42E-02	4.69E-02	4.60E-02	5.17E-02	5.00E-02		
Overall Mass Transfer - Ko - AH Eq 8	m/s	8.01E-03	6.66E-03	7.52E-03	1.29E-02	5.41E-03		
Fraction remaining - Ci/Co - AH Eq 7	dimensionless	0.938	0.948	0.941	0.901	0.957		
Removal % (1 - (Ci/Co) *100	**%**	**6.2**	**5.2**	**5.9**	**9.9**	**4.3**		

Exhibit C.2

Calculations for Water Tank Losses – Hadnot Point / Tarawa Terrace

Tanks - Thomas/Smith Approach - Hadnot Point						
Chemical Properties		PCE	TCE	1,2tDCE	VC	Bz
H	atm-m3/mol)	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
R	tm-m2/(mol-K)	8.21E-05	8.21E-05	8.21E-05	8.21E-05	8.21E-05
T	K	2.93E+02	2.93E+02	2.93E+02	2.93E+02	2.93E+02
H'	dimensionless	5.44E-01	2.94E-01	3.08E-01	9.02E-01	1.81E-01
Dw	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Da	cm2/s	8.13E-02	8.90E-02	8.65E-02	1.03E-01	9.80E-02
MW	g/mol	1.66E+02	1.31E+02	96.90	6.25E+01	7.81E+01
(D)O2,w	cm2/s	8.99E-06	8.99E-06	8.99E-06	8.99E-06	8.99E-06
(D)O2,a	cm2/s	9.80E-02	9.80E-02	9.80E-02	9.80E-02	9.80E-02
kvc/kvo - Table 15-2*	dimensionless	5.20E-01	5.70E-01	7.70E-01	8.60E-01	5.70E-01
*DCE&VC from Hennet						
Hadnot Point						
Raw Water (0.8MG, Q=5MGD)						
Residence time	Hour	3.84E+00	3.84E+00	3.84E+00	3.84E+00	3.84E+00
(kv)env - Table 15-3, low calculated	**1/hour**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**
(Kcx)env - Eq 15-22	1/hour	2.81E-03	3.25E-03	5.27E-03	6.28E-03	3.25E-03
C/Co - Eq 15-11	dimensionless	9.89E-01	9.88E-01	9.80E-01	9.76E-01	9.88E-01
R = (1-C/Co)*100	**%**	**1.07**	**1.24**	**2.00**	**2.38**	**1.24**
(kv)env - Table 15-3, low literature	**1/hour**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**
(Kcx)env - Eq 15-22	1/hour	1.69E-03	1.95E-03	3.16E-03	3.77E-03	1.95E-03
C/Co - Eq 15-11	dimensionless	9.94E-01	9.93E-01	9.88E-01	9.86E-01	9.93E-01
R = (1-C/Co)*100	**%**	**0.65**	**0.75**	**1.21**	**1.44**	**0.75**
Clearwell (2.5 MG, Q=5MGD)						
Residence time	Hour	1.20E+01	1.20E+01	1.20E+01	1.20E+01	1.20E+01
(kv)env - Table 15-3, low calculated	**1/hour**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**
(Kcx)env - Eq 15-22	1/hour	2.81E-03	3.25E-03	5.27E-03	6.28E-03	3.25E-03
C/Co - Eq 15-11	dimensionless	9.67E-01	9.62E-01	9.39E-01	9.27E-01	9.62E-01
R = (1-C/Co)*100	**%**	**3.32**	**3.83**	**6.12**	**7.26**	**3.83**
(kv)env - Table 15-3, low literature	**1/hour**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**
(Kcx)env - Eq 15-22	1/hour	1.69E-03	1.95E-03	3.16E-03	3.77E-03	1.95E-03
C/Co - Eq 15-11	dimensionless	9.80E-01	9.77E-01	9.63E-01	9.56E-01	9.77E-01
R = (1-C/Co)*100	**%**	**2.00**	**2.32**	**3.72**	**4.42**	**2.32**
Water Tower (0.3 MG, Q=1.25MGD)						
Residence time	Hour	5.76E+00	5.76E+00	5.76E+00	5.76E+00	5.76E+00
(kv)env - Table 15-3, low calculated	**1/hour**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**
(Kcx)env - Eq 15-22	1/hour	2.81E-03	3.25E-03	5.27E-03	6.28E-03	3.25E-03
C/Co - Eq 15-11	dimensionless	9.84E-01	9.81E-01	9.70E-01	9.64E-01	9.81E-01
R = (1-C/Co)*100	**%**	**1.61**	**1.86**	**2.99**	**3.56**	**1.86**
(kv)env - Table 15-3, low literature	**1/hour**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**
(Kcx)env - Eq 15-22	1/hour	1.69E-03	1.95E-03	3.16E-03	3.77E-03	1.95E-03
C/Co - Eq 15-11	dimensionless	9.90E-01	9.89E-01	9.82E-01	9.79E-01	9.89E-01
R = (1-C/Co)*100	**%**	**0.97**	**1.12**	**1.80**	**2.15**	**1.12**

Tanks - Thomas/Smith Approach - Tarawa Terrace						
Chemical Properties		PCE	TCE	1,2tDCE	VC	Bz
H	atm-m3/mol)	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
R	tm-m2/(mol-K)	8.21E-05	8.21E-05	8.21E-05	8.21E-05	8.21E-05
T	K	2.93E+02	2.93E+02	2.93E+02	2.93E+02	2.93E+02
H'	dimensionless	5.44E-01	2.94E-01	3.08E-01	9.02E-01	1.81E-01
Dw	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Da	cm2/s	8.13E-02	8.90E-02	8.65E-02	1.03E-01	9.80E-02
MW	g/mol	1.66E+02	1.31E+02	96.90	6.25E+01	7.81E+01
(D)O2,w	cm2/s	8.99E-06	8.99E-06	8.99E-06	8.99E-06	8.99E-06
(D)O2,a	cm2/s	9.80E-02	9.80E-02	9.80E-02	9.80E-02	9.80E-02
kvc/kvo - Table 15-2*	dimensionless	5.20E-01	5.70E-01	7.70E-01	8.60E-01	5.70E-01
*DCE&VC from Hennet						
Tarawa Terrace						
Clearwell (0.5 MG, Q= 1 MGD)						
Residence time	Hour	1.80E+01	1.80E+01	1.80E+01	1.80E+01	1.80E+01
(kv)env - Table 15-3, low calculated	**1/hour**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**
(Kcx)env - Eq 15-22	1/hour	2.81E-03	3.25E-03	5.27E-03	6.28E-03	3.25E-03
C/Co - Eq 15-11	dimensionless	9.51E-01	9.43E-01	9.10E-01	8.93E-01	9.43E-01
R = (1-C/Co)*100	**%**	**4.93**	**5.69**	**9.04**	**10.70**	**5.69**
(kv)env - Table 15-3, low literature	**1/hour**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**
(Kcx)env - Eq 15-22	1/hour	1.69E-03	1.95E-03	3.16E-03	3.77E-03	1.95E-03
C/Co - Eq 15-11	dimensionless	9.70E-01	9.65E-01	9.45E-01	9.34E-01	9.65E-01
R = (1-C/Co)*100	**%**	**2.99**	**3.45**	**5.53**	**6.56**	**3.45**
Water Tower (0.25 MG, Q=1.MGD)						
Residence time	Hour	6.00E+00	6.00E+00	6.00E+00	6.00E+00	6.00E+00
(kv)env - Table 15-3, low calculated	**1/hour**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**	**8.00E-03**
(Kcx)env - Eq 15-22	1/hour	2.81E-03	3.25E-03	5.27E-03	6.28E-03	3.25E-03
C/Co - Eq 15-11	dimensionless	9.83E-01	9.81E-01	9.69E-01	9.63E-01	9.81E-01
R = (1-C/Co)*100	**%**	**1.67**	**1.93**	**3.11**	**3.70**	**1.93**
(kv)env - Table 15-3, low literature	**1/hour**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**
(Kcx)env - Eq 15-22	1/hour	1.69E-03	1.95E-03	3.16E-03	3.77E-03	1.95E-03
C/Co - Eq 15-11	dimensionless	9.90E-01	9.88E-01	9.81E-01	9.78E-01	9.88E-01
R = (1-C/Co)*100	**%**	**1.01**	**1.16**	**1.88**	**2.24**	**1.16**

Exhibit C.3

Calculations for Equilibrium VOC Losses in Half-filled water buffalo tank

Equilibrium Partitioning Between Liquid (Water) and Gas Phase																
		PCE			TCE			1,2tDCE			VC			Bz		
Dl	m2/s	7.59E-10			8.43E-10			1.17E-09			1.38E-09			8.99E-10		
Dg	m2/s	8.13E-06			8.90E-06			8.65E-06			1.03E-05			9.82E-06		
R	atm-m2/(mol-K)	8.21E-05			8.21E-05			8.21E-05			8.21E-05			8.21E-05		
T	K	2.93E+02			2.93E+02			2.93E+02			2.93E+02			2.93E+02		
H	atm-m3/mol)	1.31E-02			7.07E-03			7.42E-03			2.17E-02			4.36E-03		
H'	dimensionless	5.44E-01			2.94E-01			3.08E-01			9.02E-01			1.81E-01		
Equilibrium Calcs for tank	Co =	1.00E+02		mg/m^3												
Tank Fullness																
Frac Full	Vg/Vw	fw	Cw	R (%)	fw	Cw	R (%)	fw	Cw	R (%)	fw	Cw	R (%)	fw	Cw	R (%)
0.50	1.00E+00	6.48E-01	64.75	35.25	7.73E-01	77.29	22.71	7.64E-01	76.44	23.56	5.26E-01	52.59	47.41	8.47E-01	84.66	15.34

Schwarzenbach et al. 1993; Schwarzenbach et al., 1995

fw = mass in aqueous phase / total mass

fw = {(CwVw)/(CwVw+CaVa)} = {1/(1+(CaVa/(CwVw))} = (1/(1+Kh'(Va/Vw))}

Cw = fw *Mtot/Vw = fw * (Co*Vw)/Vw = fw * Co

R = {(Co - Cw)/Co}*100

Exhibit C.4

Thompson/Smith calculations for 6 hour losses (mid-point time of 12 hours shift) in water buffaloes

Tanks - Thomas/Smith Approach - Water Buffaloes						
Chemical Properties		PCE	TCE	1,2tDCE	VC	Bz
H	atm-m3/mol)	1.31E-02	7.07E-03	7.42E-03	2.17E-02	4.36E-03
R	tm-m2/(mol-K)	8.21E-05	8.21E-05	8.21E-05	8.21E-05	8.21E-05
T	K	2.93E+02	2.93E+02	2.93E+02	2.93E+02	2.93E+02
H'	dimensionless	5.44E-01	2.94E-01	3.08E-01	9.02E-01	1.81E-01
Dw	cm2/s	7.59E-06	8.43E-06	1.17E-05	1.38E-05	8.99E-06
Da	cm2/s	8.13E-02	8.90E-02	8.65E-02	1.03E-01	9.80E-02
MW	g/mol	1.66E+02	1.31E+02	96.90	6.25E+01	7.81E+01
(D)O2,w	cm2/s	8.99E-06	8.99E-06	8.99E-06	8.99E-06	8.99E-06
(D)O2,a	cm2/s	9.80E-02	9.80E-02	9.80E-02	9.80E-02	9.80E-02
kvc/kvo - Table 15-2*	dimensionless	5.20E-01	5.70E-01	7.70E-01	8.60E-01	5.70E-01
*DCE&VC from Hennet						
<u>Water Buffaloes</u>						
<u>Residence time - 6 hrs</u>	Hour	6.00E+00	6.00E+00	6.00E+00	6.00E+00	6.00E+00
(kv)env - Table 15-3, low literature	**1/hour**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**	**4.80E-03**
(Kcx)env - Eq 15-22	1/hour	1.69E-03	1.95E-03	3.16E-03	3.77E-03	1.95E-03
C/Co - Eq 15-11	dimensionless	9.90E-01	9.88E-01	9.81E-01	9.78E-01	9.88E-01
R = (1-C/Co)*100	**%**	**1.01**	**1.16**	**1.88**	**2.24**	**1.16**

APPENDIX A:

Response to Reports of Remy J.-C. Hennet & Jay Brigham

Regarding Water Buffaloes

Introduction

The reports of Remy J.-C. Hennet & Jay Brigham, dated December 9, 2024, discuss the use of water buffaloes at Camp Lejeune. Certain of my calculations set forth in the body of my report depend on the design and configuration of the water buffaloes used at Camp Lejeune, especially as this relates to the filling process. This appendix sets forth my understanding and opinions regarding the models of water buffaloes used from 1953 to 1987 at Camp Lejeune, which forms the basis of certain of my calculations. Based on my review of historical documentation, as discussed below, I disagree in part with Drs. Hennet and Brigham regarding how water buffaloes were filled at Camp Lejeune over time.

Response regarding Water Buffalo "Filling"

Dr. Hennet opines that:

> *"In summary. A substantial portion of COCs that may have been present in the treated water used to fill a water buffalo would have unavoidably been lost to evaporation during filling, use, and variations of temperature. These COC reductions between the raw water and the water in the water buffaloes would have been in the order of 52% to 73% based on my estimation." (pg. 5-43)*

Of the three potential causes of VOC reductions, Dr. Hennet claims the majority of the loss is attributed to the presumed historical "filling" of the tank:

> *"The COC reductions in the water filled and stored in the water buffaloes can be estimated. The largest COC mass removal from the water is during fill-up of the tank when conditions are ripe for volatilization, through increased contact between water and air due to the forcing of water through a strainer that generates water jets and droplets that greatly increase the surface area of the water/air interface for COC exchange to the tank air. The air containing COCs is expelled from the tank during filling. The filling of the tank through a strainer would involve spraying, splashing, and turbulent flow." (pg. 5-40)*

> *"These loss rates likely apply during the first half of the tank filling process because the filling strainer extends about halfway down into the tank. For the second half of the filling process, it is assumed that the loss rate declines linearly until the tank is completely full. Considering this decrease in loss rate as the tank fills results in an overall loss rate estimate of about 44% for TCE." (pg. 5-40)*

In making these claims, Dr. Hennet assumed:

1. All of the water buffaloes in use from August 1st 1953 to December 31st 1987 were equipped with a *"filling port on the water tank contain[ing] a strainer screen."*
2. That all the water buffaloes were filled through the filling port.

A review of the history of the water buffalo and specifically its use at Camp Lejeune demonstrates that these assumptions are incorrect.

Chronological Listing of Water Buffaloes – 1943 to 1991

The WWII era water buffalo was known as a "250-gallon Tank Trailer" or a "1-Ton, 2-Wheel Water Trailer". (TM9-833 Army Technical Manual, BRIGHAM_USA_0000043022). The unit is shown in Figure 1 below.

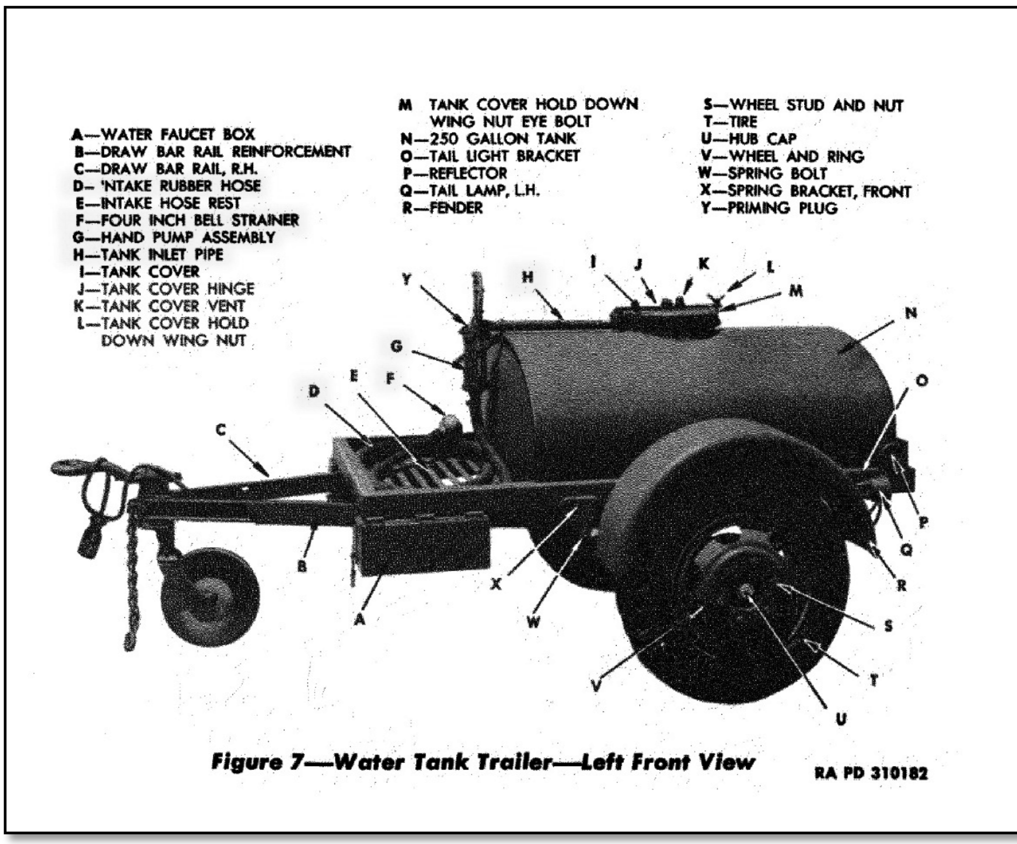


Figure 7—Water Tank Trailer—Left Front View

Figure 1 – WWII Water Buffalo. TM9-833 Army Technical Manual, BRIGHAM_USA_0000043035.

This model water buffalo was equipped with a hand pump, intake hose and bell strainer to allow filling the unit in the field from sources such as ponds or streams. In those cases, the bell strainer would be placed in the water source, the pump handle would be pumped and the water would flow from the source, through the bell strainer, rubber hose, pump and then to part "H", the tank inlet pipe, which dumps the water into the tank at the manhole cover.

In the manual for the WWII era water buffalo (TM9-833 Army Technical Manual, BRIGHAM_USA_0000043022), users are instructed to:

> (1) **WATER TRAILER.** On the water trailer, the manhole cover should be kept closed and held down tightly with the wing nut, except when tank is being filled through this cover. The cover on the bell strainer at the end of the intake hose should be kept closed, except when filling the tank with the hand pump. The water faucet box covers should be kept closed and locked with snap, except when drawing water from the faucets.

BRIGHAM_USA_0000043040.

On this model, which is not equipped with a fill hatch like what is described in Dr. Hennet's report, the filling of the tank is accomplished through the manhole cover, which as the name describes is a man-sized hatch in the top of the tank that allows filling, inspection and cleaning of the tank. There is no strainer involved in the process.

Chronologically the next version of the water buffalo was designated the M106. The M106 was very similar to its predecessor with two notable exceptions. The first is its capacity was increased to 400 gallons. The second is the addition of a filler hatch assembly located at the top of the tank near the front as shown in Figure 2. (TM9-875B Army Technical Manual (Oct. 1951)).

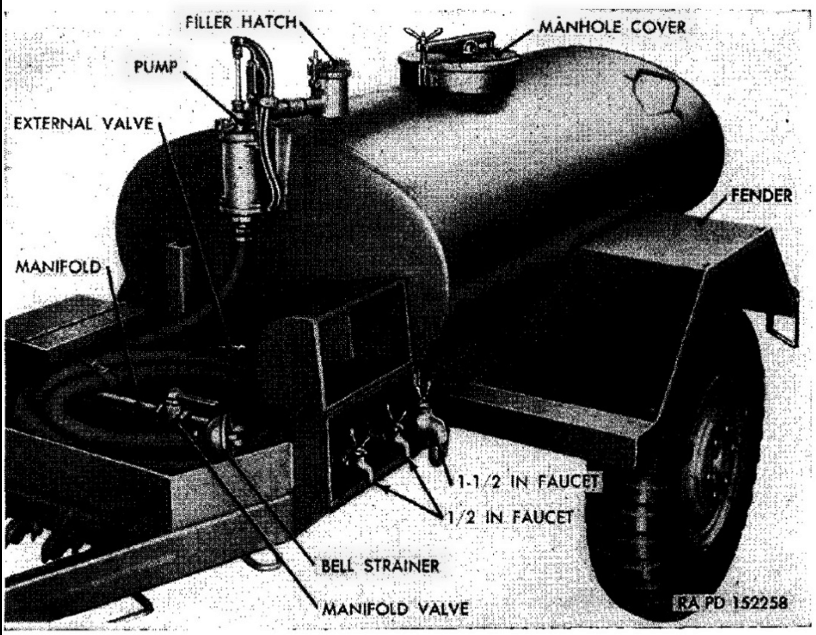


Figure 8. Water tank equipment of water tank trailer M106.

Figure 2 – M106 Water Buffalo. TM9-875B Army Technical Manual (Oct. 1951), p. 9.

The addition of the filler hatch assembly changed the water path from the pump. Instead of exiting into the tank at the manhole cover, the water from the pump now travels to the filler hatch. The M106 has a strainer in the neck of the filler hatch (See Figure 3) which is equipped with a fine mesh screen that removes particulate matter from the incoming water.

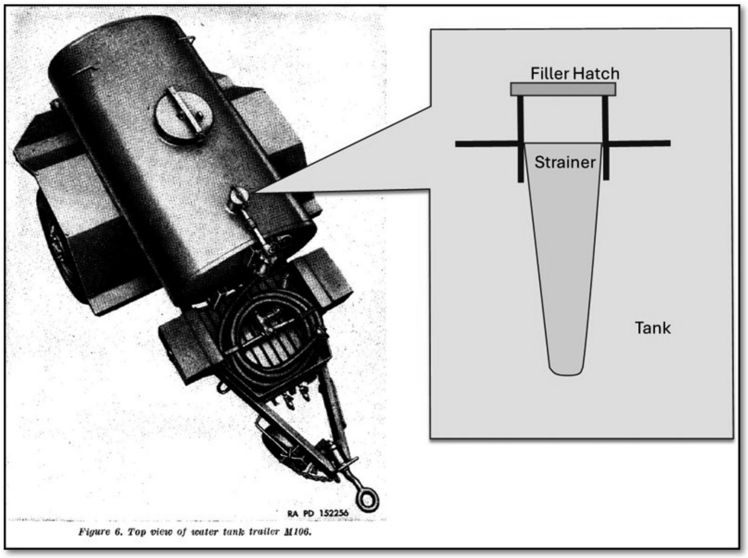
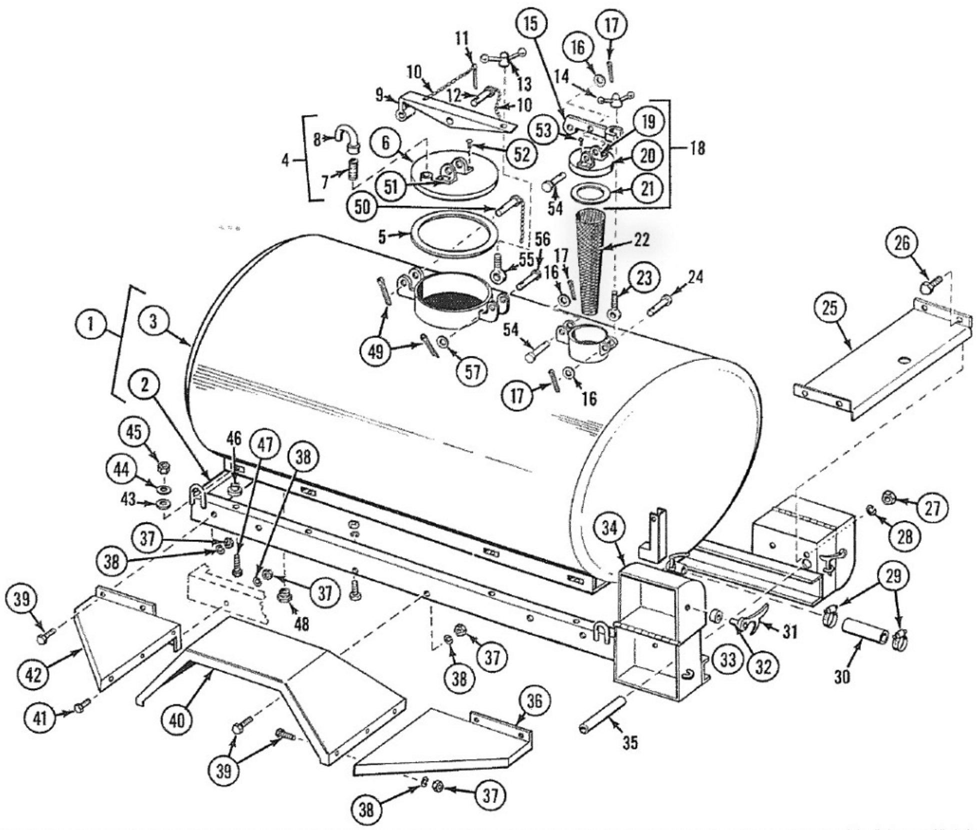


Figure 3 – M106 Strainer (TM9-875B Army Technical Manual (Oct. 1951), p. 7)

The addition of the strainer is especially important when the water supply is a pond, stream or other similar source, but it provides no benefit when being filled with finished water from a water distribution system such as the Hadnot Point WTP. An exploded view of the filler hatch and strainer is shown in Figure 4 below.



(1) ILLUST (a) FIG NO	(1) ILLUST (b) ITEM NO	(2) SOURCE, MAINT AND RECOVERABILITY CODE (a) MATERIEL CODE	(2) (b) SOURCE	(2) (c) MAINTENANCE LEVEL	(2) (d) RECOVERABILITY	(3) FEDERAL STOCK NO	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) QTY INC IN UNIT	(7) 15-DAY MAINTENANCE ALLOWANCE PER 100 EQUIPMENTS (a) CO OR BTRY	(7) (b) SEP CO SEP BN OR REGT	(7) (c) 3RD ECH (DIR SUP)	(7) (d) 4TH ECH (GEN SUP)
							WATER TANK, TANK FRAME, AND RELATED PARTS - (M106A1, M107A1, M107A2, and M107A2C) (Fig. 133)						
133	22		P	O		4730-546-5898	STRAINER ELEMENT, SEDIMENT: (8735825)	ea	1				

FIGURE 4 – M107A1 Strainer Shown, M106 is the same (TM 9-2330-213-14 Army Technical Manual (1964), BRIGHAM_USA_0000041587).

The service maintenance manual for the M106 includes this description of the loading of the water tank:

Section III. OPERATION OF REGULAR EQUIPMENT OF WATER TANK TRAILER M106

32. Loading and Unloading Water Tank

a. CHECK CONDITION OF TANK BEFORE LOADING. Unlatch manhole cover (fig. 8), raise cover, and check to determine if tank is in proper condition to receive and transport water for purpose intended. Clean tank and flush tank, valves, piping, and faucets, if tactical situation permits.

Note. Highest sanitary conditions must be preserved in handling water for drinking purposes.

b. LOADING TANK FROM OVERHEAD, FREE-FLOWING SOURCE. Unlatch filler hatch cover, raise cover, and check to determine if sleeve strainer is in place and is clean. Direct flow of water into filler hatch (fig. 8). Capacity of tank is 400 gallons. When filled, latch filler hatch cover.

c. LOADING TANK FROM SOURCE FROM WHICH WATER MUST BE PUMPED. Position trailer adjacent to water supply on ground as solid as possible.

Note. Weight of trailer will increase approximately 3,300 pounds when filled.

Unfasten bell strainer and hose assembly (fig. 8), turn wing nut to open bell strainer, and place bell strainer in water source. Prime pump by unscrewing priming plug and filling cylinder above plunger assembly with clean water. Operate handle up and down until tank is filled.

Figure 5 – M106 Filling. TM9-875B Army Technical Manual (Oct. 1951), p.43.

The M106 was the first water buffalo to utilize the filler hatch and strainer screen. The fill point moved from the manhole cover to the filler hatch with the introduction of this modelwhen using an “Overhead Free-Flowing source”.

The M107 was the next iteration of the water buffalo. The major change was the removal of the hand pump and associated components (Figure 6) (TM 9-2330-213-14 Army Technical Manual (Jan. 1964), BRIGHAM_USA_0000041587). All other aspects of the M106 and M107 remain the same.

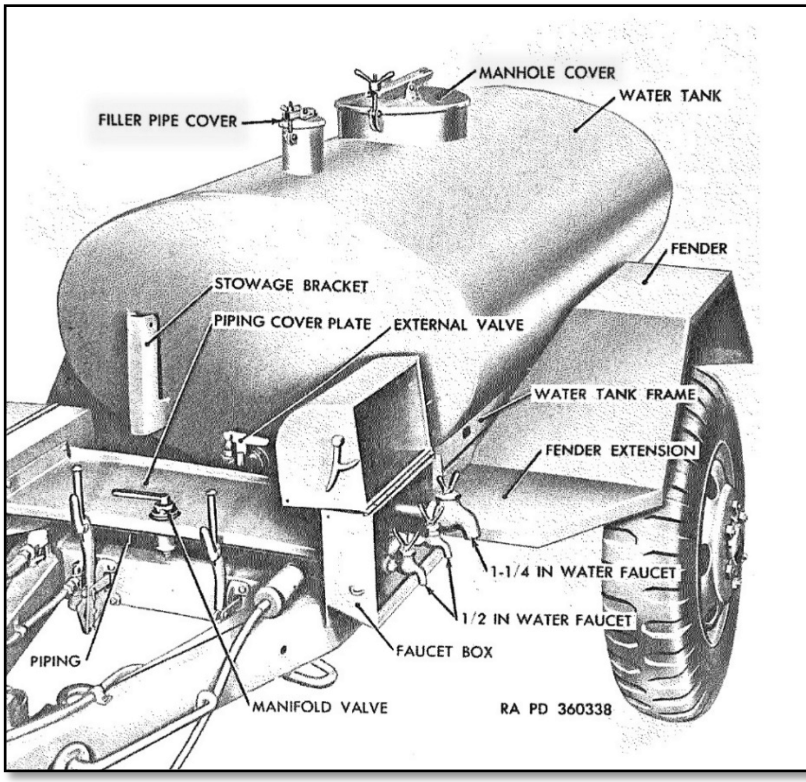


Figure 6 – M107A1. BRIGHAM_USA_0000041599.

Filling the M107A1 is still directed to be done through the filler hatch as described in Figure 7 below.

d. Loading the Water Tank.

(1) Open manhole cover and make sure tank is clean. Flush tank, valves, piping, and faucets if tactical situation permits.

Note. Fill the tank through the filler pipe.

(2) All water tank trailers may be filled from an overhead, free flowing source.

Warning: Highest sanitary practices must be exercised in handling water for drinking purposes.

(3) Open filler pipe cover and make sure the strainer is in place and clean. When filled, latch the filler pipe cover. Tank capacity is 400 gallons.

Figure 7 – M107A1 filling. BRIGHAM_USA_0000041622)

Nineteen sixty-four saw the introduction of the M149. The first version of the M149 can be identified by its unique tank shape as shown in Figures 8 & 9 below (TM 9-2330-267-14 Army Technical Manual (Oct 1964), BRIGHAM_USA_0000041997). Other than the tank shape the M149 is essentially the same as the M107 including the 400-gallon capacity and use of a filler hatch and a strainer.

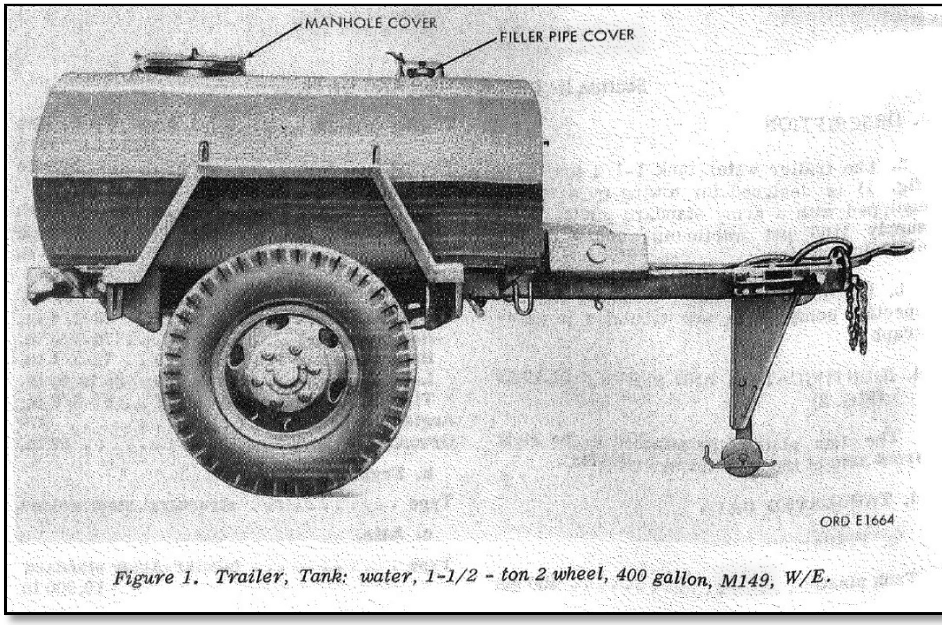


Figure 8 – M149. BRIGHAM_USA_0000042006.

Figure 9 – M149 Tank Shape (https://www.ebay.com/itm/223995969791)

The next generation of the M149, designated the M149A1 is identical to the M149 with the notable exception that the filler hatch was discontinued. The illustration below (Figure 10) is from the TM9-2330-267-14 Army Technical Manual (June 1971). It shows both the M149 (top) and its replacement, the M149A1 (bottom).

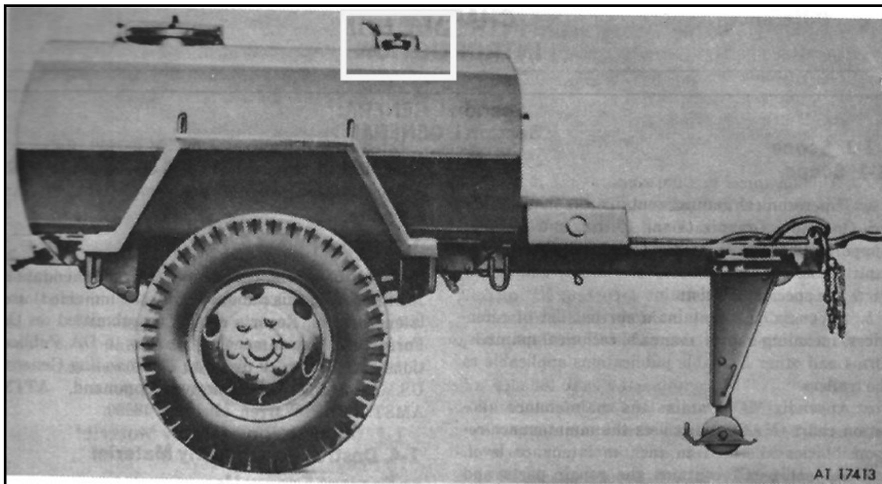


Figure 1-1. Trailer, Tank water, 400 gallon, 1½ ton, 2-wheel, right side view of the M149.

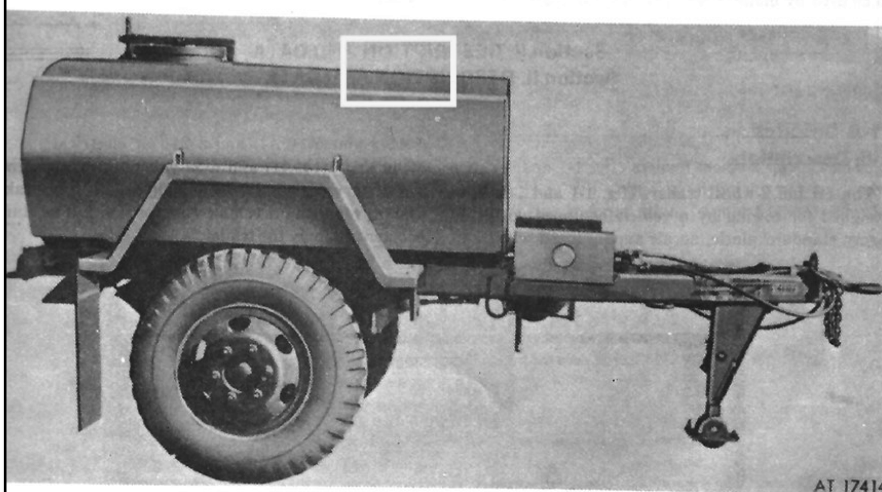


Figure 1-2. Trailer, Tank: water, 400 gallon, 1½ ton, 2-wheel, right side view of the M149A1 and M625.

Figure 10 – M149 and M149A1 (TM9-2330-267-14 Army Technical Manual, p. 1-2)

The earliest M149A1 identified was manufactured in January 1968. The photos in Figure 11 show the lack of a filler hatch.

Figure 11 – M149A1: No filler hatch (https://www.bigiron.com/Lots/1968Army400-Gal2-WheelM149TankTrailer)

This design change represents a significant shift in the water buffalo filling methodology as there is only one way to fill the tank – through the manhole cover.

This change in methodology was further demonstrated when the Army issued Change No. 3 for the M149 & M149A1 in December of 1968 (BRIGHAM_USA_0000041969), which consisted of 28 pages with the instructions to "Remove old pages and insert new pages as indicated below." On page 1, Chapter 1 Introduction, Section II. Description and Data there is a note. The note states (Figure 12):

Section II. DESCRIPTION AND DATA

3. Description

a. The trailers, water tank, 1½-ton, M149 and M149A1 (fig. 1) are designed for towing by a vehicle equipped with an Army standard pintle, an air supply (100 psi minimum), and a 24-volt electrical system.

b. The trailer, water tank, 1½-ton, M625, is designed for towing by a vehicle equipped with an Army standard pintle, an air supply (vacuum) for the operation of a hydrovac brake system and a 12-volt electrical system.

a. Trailer

Note. Some trailers are not equipped with a tank strainer assembly. A defective assembly will be removed but not replaced.

Tank, plastic...............400 gal
Towing vehicle
(M149, M149A1)...........2½-Ton, 6X6, M35, M35A1, M211
(M625)...................2½-Ton, 6X6, M602
Towing facilities............lunette
Maximum towing speed:
Highway...............50 mph
Cross-country..........25 mph

Figure 12 – 1968, Strainer note. TM 9-2330-267-14 C3 (Dec. 1968), BRIGHAM_USA_0000041973.

This note is not found in the original M149 Manual issued in 1964 as shown below in Figure 13:

Section II. DESCRIPTION AND DATA

3. DESCRIPTION

a. The trailer water tank 1-1/2 ton, M149 (fig. 1) is designed for towing by a vehicle equipped with a army standard pintle, an air supply (100 psi minimum), and a 24-volt electrical system.

b. Performance details, technical data and specific components are tabulated in paragraph 5.

4. IDENTIFICATION AND SERVICE PLATES

Towing vehicle	2-1/2 ton, 6 x 6, M35 M35A1,& M211
Towing facilities	lunette
Maximum towing speed:	
Highway	50 mph
Cross-country	25 mph
Net weight	2500 lb
Overall dimensions:	
Length	83 in.
Width	82-1/4 in.
Height (empty)	76-1/2 in.
Height (loaded)	72-3/4 in.
Lunette height	36 to 40 in.

Figure 13 – 1964 version, no note. TM 9-2330-267-14 Army Technical Manual (1964), BRIGHAM_USA_0000042005.

The significance of this note is that as early as December 1968 the army is acknowledging that the M149A1 was not equipped with a strainer, and the use of the strainer became optional for the M149 in cases where the strainer was damaged or found defective.

In 1970 the M149A1 underwent a tank design change. The M149 went from the non-oval, non-round tank shape shown in the top of Figure 14 below to a round tank shape as shown in the bottom of Figure 14. Again, note no filler hatch on the M149A1.

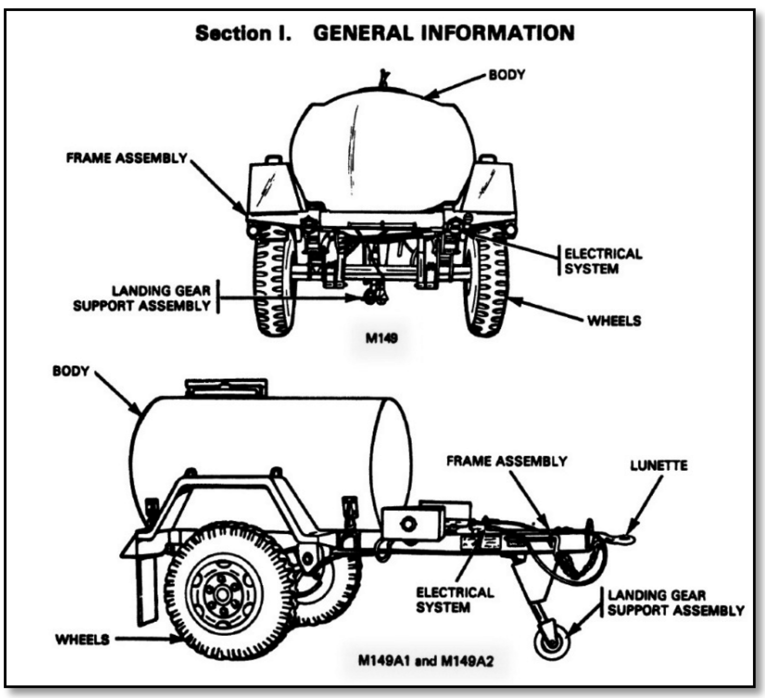


Figure 14 – M149 (top), M149A1 & M149A2 (TM9-2330-267-14P Army Technical Manual (1981), BRIGHAM_USA_0000043121)

Again, with the discontinuation of the filler hatch there is only one method available to fill the M149A1 water buffalo – through the manhole cover.

Generational Changes to M107 Technical Manual and Tank Filling Process

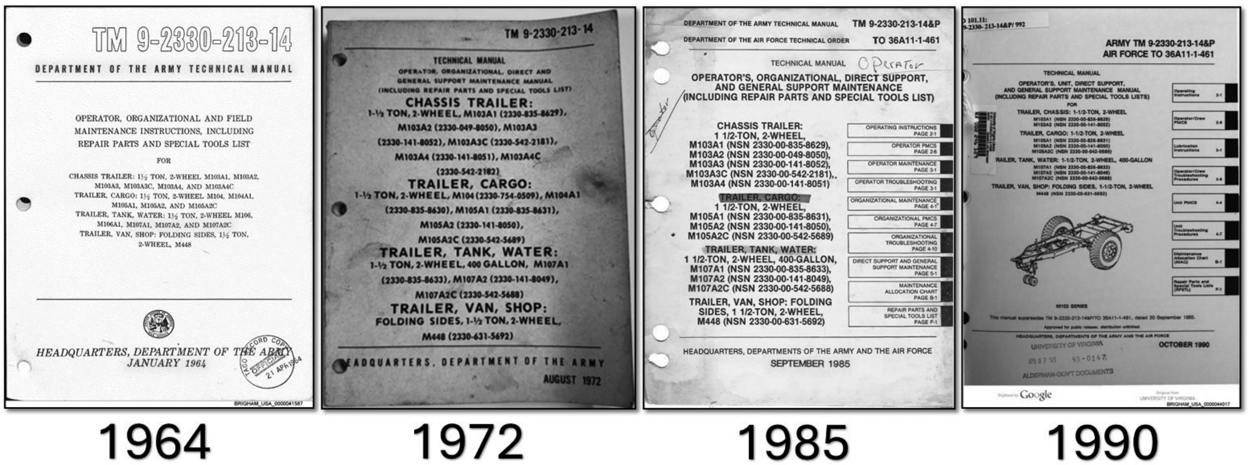


Figure 15 – M107 Technical Manuals 1964 to 1990

The Army periodically published updated manuals for the various pieces of equipment it oversees (Figure 15). The M107 has had 3 such updates since 1964. Of interest is that the process of filling the water buffalo changed dramatically from 1964 to 1990. The filling process outlined in the 1964 edition is shown below (Figure 16).

d. Loading the Water Tank.

(1) Open manhole cover and make sure tank is clean. Flush tank, valves, piping, and faucets if tactical situation permits.

Note. Fill the tank through the filler pipe.

(2) All water tank trailers may be filled from an overhead, free flowing source.

Warning: Highest sanitary practices must be exercised in handling water for drinking purposes.

(3) Open filler pipe cover and make sure the strainer is in place and clean. When filled, latch the filler pipe cover. Tank capacity is 400 gallons.

Figure 16 – 1964 M107A1 Fill Process. TM 9-2330-213-14 Army Technical Manual (1964), BRIGHAM_USA_0000041622.

In the August 1972 edition, which supersedes the October 1964 edition shown above, the fill process switches from being done through the filler hatch to the manhole cover as described in the text below (Figure 17). The change in instructions also clarified a phrase used in earlier manuals that will be discussed below.

c. *Faucets* (fig. 1-3). The water faucet handles are squeezed together to release water from the faucets.

d. *Loading the Water Tank.*

(1) Open manhole cover and make sure tank is clean. Flush tank, valves, piping, and faucets if tactical situation permits.

(2) All water tank trailers may be filled from an overhead, free flowing source, or by pressure pump. Use manhole opening for refill operation.

WARNING

Highest sanitary practices must be exer-

Figure 17 – August 1972 M107 Fill Process. TM 9-2330-213-14 Army Technical Manual (1972)

As called out in the “Loading the Water Tank” instructions, “Use manhole opening for refill operation” (Figure 17).

The phrase of interest in the filling instructions which was used in several earlier water buffalo technical manuals is “free-flowing source.” A free-flowing source implies gravity fed, which suggests the fill hatch was never intended to be filled with a high-pressure-high-flow hose that was tapped into the base’s water distribution system. In the 1972 edition, the text specifically calls out that when filling through the manhole cover a pressure pump can be used, which is equivalent to water-flow/pressure like that supplied by the water distribution system.

In 1985 the Army reformatted the tank filling instructions. The 1985 M107 fill instructions are shown in Figure 18 below.

FILLING M107 SERIES WATER TANK TRAILER

WARNING

The highest sanitary practices must be exercised in handling water for drinking purposes. Serious illness could result from impure drinking water.

1. Position water tank trailer next to water supply on solid level ground.
2. Open manhole cover (1).
3. All water tank trailers may be filled from an overhead, free-flowing source, or by a pressure pump through manhole opening (2).

DRAWING WATER, M107 SERIES WATER TANK TRAILER

1. Open external valve (3), permitting water to flow from water tank to manifold valve (4) and faucet (5).
2. Open manifold valve (4), permitting water to flow to faucets (6 and 7).
3. Squeeze handles (8) on top of faucets (5, 6, and 7) as required, permitting water to flow.

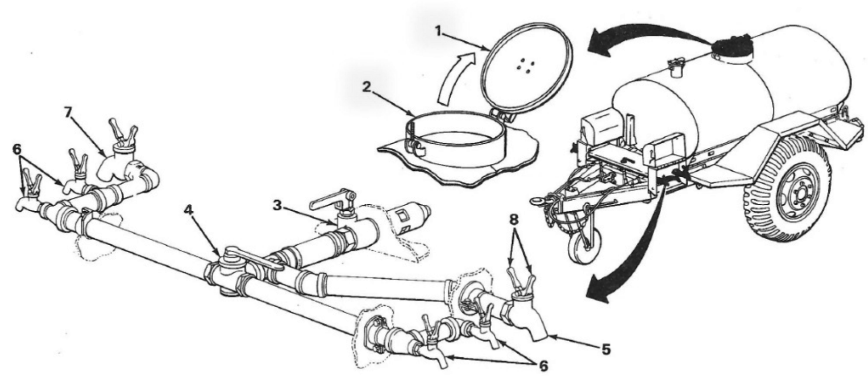


Figure 18 – 1985 M107 Fill Process. TM 9-2330-213-14&P Army Technical Manual (1985).

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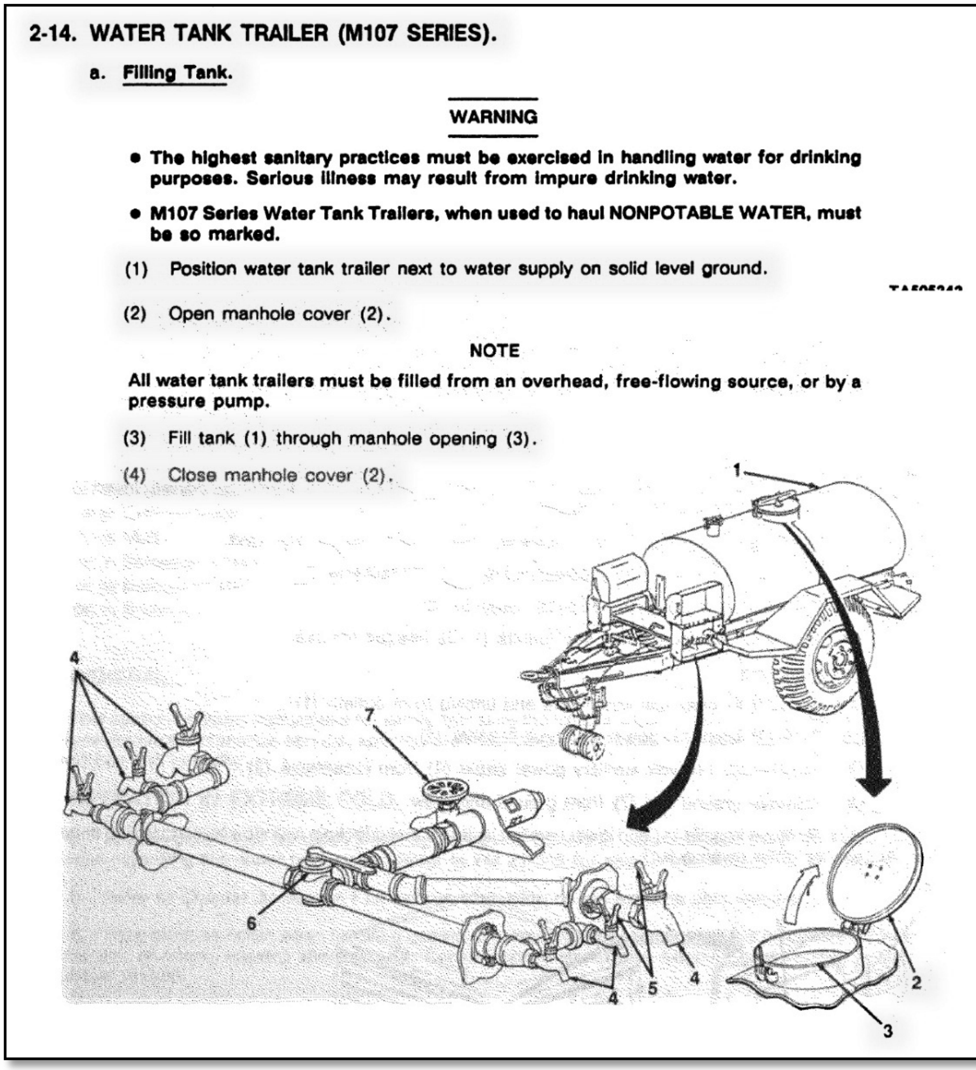
The fill process stays the same in the 1990 edition as shown in Figure 19 below.



2-14. WATER TANK TRAILER (M107 SERIES).

a. Filling Tank.

WARNING

- The highest sanitary practices must be exercised in handling water for drinking purposes. Serious illness may result from impure drinking water.
- M107 Series Water Tank Trailers, when used to haul NONPOTABLE WATER, must be so marked.

(1) Position water tank trailer next to water supply on solid level ground.

(2) Open manhole cover (2).

NOTE

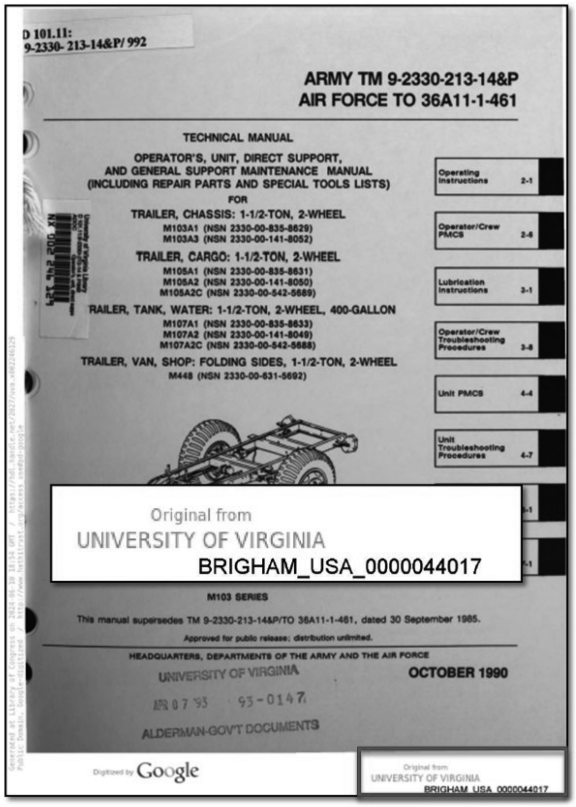
All water tank trailers must be filled from an overhead, free-flowing source, or by a pressure pump.

(3) Fill tank (1) through manhole opening (3).

(4) Close manhole cover (2).

Figure 19 – October 1990 M107 Fill Process. TM 9-2330-213-14P Army Technical Manual (1990), BRIGHAM_USA_0000044016.

An important point to be made concerning the October 1990 M107 Technical Manual shown in Figure 19 is that the manual was found in Dr. Brigham's file materials. See Figure 20. The significance of this is that Dr. Brigham's own file materials demonstrate that the filling process had changed from the 1964 manual he relies on for the fill procedure through the strainer. Once he recognized that the process had changed, he should have located sources for earlier editions of the M107 Technical Manual to determine how far back the change took place.


D 101.11:
9-2330- 213-14&P/ 992

ARMY TM 9-2330-213-14&P
AIR FORCE TO 36A11-1-461

TECHNICAL MANUAL

OPERATOR'S, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS)

FOR

TRAILER, CHASSIS: 1-1/2-TON, 2-WHEEL
M103A1 (NSN 2330-00-835-8629)
M103A3 (NSN 2330-00-141-8052)

TRAILER, CARGO: 1-1/2-TON, 2-WHEEL
M105A1 (NSN 2330-00-835-8631)
M105A2 (NSN 2330-00-141-8050)
M105A2C (NSN 2330-00-542-5689)

RAILER, TANK, WATER: 1-1/2-TON, 2-WHEEL, 400-GALLON
M107A1 (NSN 2330-00-835-8633)
M107A2 (NSN 2330-00-141-8049)
M107A2C (NSN 2330-00-542-5688)

TRAILER, VAN, SHOP: FOLDING SIDES, 1-1/2-TON, 2-WHEEL
M448 (NSN 2330-00-631-5692)

Operating Instructions 2-1
Operator/Crew PMCS 2-6
Lubrication Instructions 3-1
Operator/Crew Troubleshooting Procedures 3-8
Unit PMCS 4-4
Unit Troubleshooting Procedures 4-7

Original from
UNIVERSITY OF VIRGINIA
BRIGHAM_USA_0000044017

M103 SERIES

This manual supersedes TM 9-2330-213-14&P/TO 36A11-1-461, dated 30 September 1985.

Approved for public release; distribution unlimited.

HEADQUARTERS, DEPARTMENTS OF THE ARMY AND THE AIR FORCE

OCTOBER 1990

UNIVERSITY OF VIRGINIA
APR 07 '93 93-0147
ALDERMAN-GOV'T DOCUMENTS

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UNIVERSITY OF VIRGINIA
BRIGHAM_USA_0000044017

Figure 20 – Brigham 1990 M107 Technical Manual, BRIGHAM_USA_0000044017.

Dr. Brigham includes the photograph shown in Figure 21 (image 34) to establish that M107 water buffaloes were in use at least up to January 1977, and he even calls out the oval tank to identify the unit as a M107. What he and Dr. Hennet do not disclose in their reports, nor include in Hennet's COC loss analysis, is that the fill procedure for this and all other M107's at Camp Lejeune was through the manhole cover since January 1972.

Image 34

Oval-Shaped Water Trailer in the Field, January 27, 1977[335]


Photo by Sgt. Wesley Goodloe

ICE WATER — LCpl. Mark A. Long, a radio operator with Communication Company, H & S Bn., Force Troops-2d FSSG, takes time out for a drink of cold water during "Commex 1-77." The water was supplied by the battalion and the cold by "Mother Nature." Unusually cold weather added new dimensions of training to the exercise not normally encountered here.

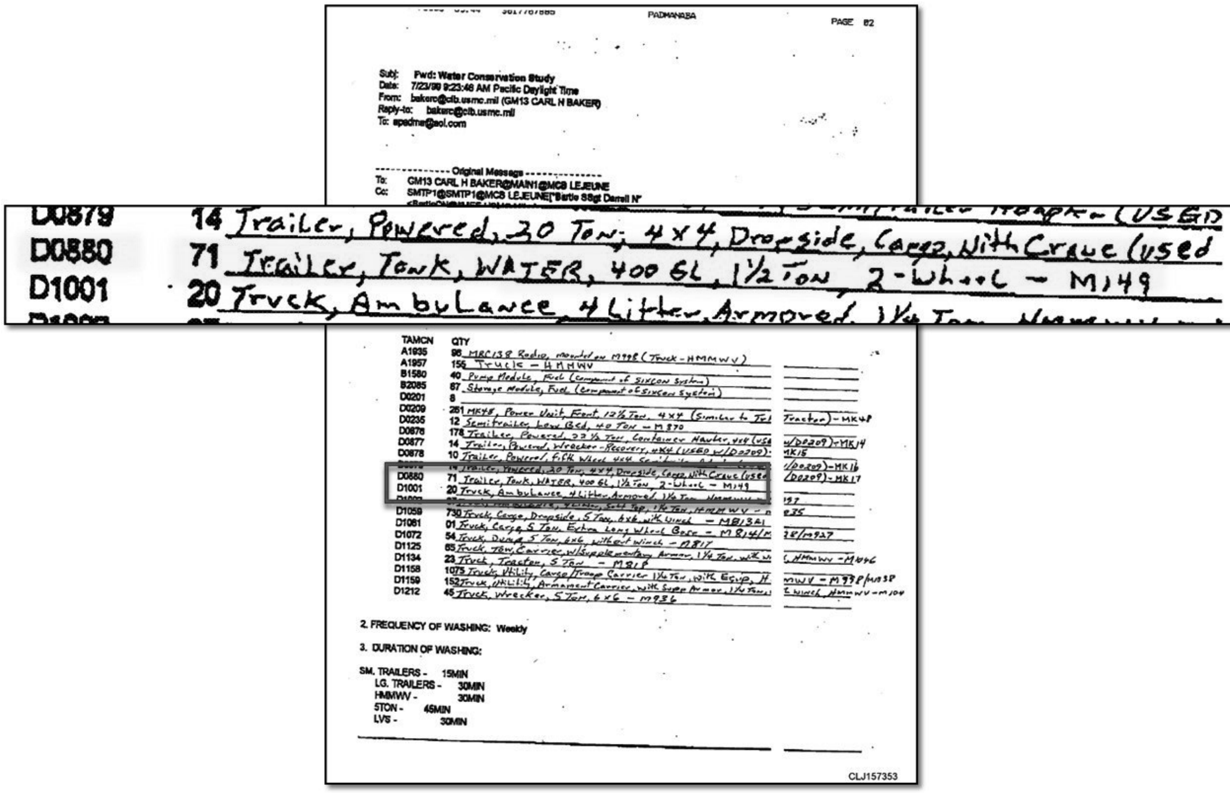
Figure 21 – Expert Brigham Image 34

According to an inventory of equipment, in 1968 Camp Lejeune had 84 M107s. (Figure 22)

1968 Equipment Inventory			
Unit	**Model**	**Stock**	**Quantity**
Artillery Regiment	M107A2	Trlr Tank M-107A2 H20 400	24
A.T. Battalion	M107	Trlr Tank M-107 400 Gal	5
Shore Party Battalion	M107A2	Trailer Tank Water 400Gal M107A2	9
M.T. Battalion	M107	Trlr Tank M-107 400 Gal	5
Medical Battalion	M107A2	Trailer Tank Water 400Gal M107A2	9
PFCON Battalion	M107A2	Trailer Tank Water M107A2	3
Headquarters Battalion	M107A2	Trailer Cargo Water 400Gal M107A2	5
2d Engineer Battalion	M107	Trlr 400 Gal M-107 (water)	5
Service Battalion	M107A2	Trailer Tank Water Gal M107A2	19
		Total Water Buffalo Inventory	**84**

Figure 22 – 1968 Camp Lejeune Water Buffalo Inventory
(Base Master Plan-Approx-1972-00368 (bates CLJA_WATERMODELING_01-0000948169 to CLJA_WATERMODELING_01-0000948933)

By no later than and likely well before 1999, the water buffalo inventory switched to exclusively M149s as depicted in Figure 23 below. According to this document there were 71 M149s.


PADMANABA PAGE 02

Subj: Fwd: Water Conservation Study
Date: 7/23/99 9:23:46 AM Pacific Daylight Time
From: bakerc@clb.usmc.mil (GM13 CARL H BAKER)
Reply-to: bakerc@clb.usmc.mil
To: apadma@aol.com

---------------- Original Message ----------------
To: GM13 CARL H BAKER@MAIN1@MCB LEJEUNE
Cc: SMTP1@SMTP1@MCB LEJEUNE["Bartle SSgt Darrell N"

TAMCN	QTY	
A1935	96	MRC138 Radio, mounted on M998 (Truck - HMMWV)
A1957	155	Truck - HMMWV
B1580	40	Pump Module, Fuel (Component of SIXCON System)
B2085	67	Storage Module, Fuel (Component of SIXCON System)
D0201	8	
D0209	261	MK48, Power Unit, Front, 12½ Ton, 4x4 (Similar to Tr[illegible] Tractor) - MK48
D0235	12	Semitrailer, Low Bed, 40 Ton - M870
D0876	178	Trailer, Powered, 22½ Ton, Container Hauler, 4x4 (use[d] w/D0209) - MK14
D0877	14	Trailer, Powered, Wrecker - Recovery, 4x4 (USED w/D0209) - MK15
D0878	10	Trailer, Powered, Fifth Wheel 4x4 [illegible] w/D0209) - MK16
D0879	14	Trailer, Powered, 20 Ton, 4x4, Dropside, Cargo, With Crane (used w/D0209) - MK17
D0880	71	Trailer, Tank, WATER, 400 GL, 1½ Ton, 2-Wheel - M149
D1001	20	Truck, Ambulance, 4 Litter, Armored, 1¼ Ton, [illegible]
[illegible]	[illegible]	[illegible], Soft Top, 1¼ Ton, HMMWV - [illegible]
D1059	730	Truck, Cargo, Dropside, 5 Ton, 6x6, with Winch - M813A1
D1061	01	Truck, Cargo, 5 Ton, Extra Long Wheel Base - M814/M[illegible] 28/M927
D1072	54	Truck, Dump, 5 Ton, 6x6, without winch - M817
D1125	65	Truck, Tow, Carrier, w/Supplementary Armor, 1¼ Ton, with w[illegible], HMMWV - M1046
D1134	23	Truck, Tractor, 5 Ton - M818
D1158	1075	Truck, Utility, Cargo/Troop Carrier 1¼ Ton, with Equip, H[MMWV] - M998/M1038
D1159	152	Truck, Utility, Armament Carrier, with Supp Armor, 1¼ Ton, [illegible] winch, HMMWV - M104[illegible]
D1212	45	Truck, Wrecker, 5 Ton, 6x6 - M936

2. FREQUENCY OF WASHING: Weekly

3. DURATION OF WASHING:

SM. TRAILERS - 15MIN
LG. TRAILERS - 30MIN
HMMWV - 30MIN
5TON - 45MIN
LVS - 30MIN

CLJ157353

Figure 23 – 1999 Camp Lejeune Water Buffalo Inventory

(CLJ157174.pdf, Bates CLJ157174 to CLJ157472)

This is supported by the affidavit provided by Mr. Mark Cagiano, who was stationed at Camp Lejeune from 1976 to 1980. One of the positions Mr. Cagiano held during this time was Battery Motor Transport Officer. In this position he had the opportunity to observe water buffaloes on a regular basis. According to his affidavit, during his time at Camp Lejeune he observed only one type of water buffalo – the M149A1. This supports that the base was transitioning from the M107 to the M149A1 during the 1970's.Mr. Cagiano stated that he recalled water buffaloes being filled through the manhole from a standpipe, and on occasion from a fire hydrant.

Regardless of the mix between M107s and M149s, from 1972 to 1987 all water buffaloes would have been filled through the manhole cover based on operating guidance discussed above.

For those M107s earlier than 1972 it is my position that these units more likely than not would have also been filled through the manhole cover. I base this on the following:

1. An affidavit provided by Mr. Ernest Hunt. In his affidavit, Mr. Hunt states that he was in motor transport as a truck driver from 1965 to 1966. On a regular basis he observed the filling of M107 water buffaloes, and all of those he observed were filled through the manhole cover.
2. The filler hatch as outlined in several of the manuals is designated for free-flowing water supplies and in early versions fed by a hand-pump.
3. From at least 1968 to 1972 (and thereafter) there were M149A1 (no filler hatch) water buffaloes in use at Camp Lejeune that could only be filled through the manhole cover, making it difficult to believe Marines would be filling the M107 though the flow-constrained filler neck while using the manhole cover to fill the M149A1.

Water Buffalo Filling Examples

Figures 24 to 27 below show M149A1 water buffaloes being filled through the manhole cover. These photos are post-1987, but the process is the same regardless of when it took place.

Figure 24 – Filling M149A1 Water Buffalo[1]

[1] https://www.alamy.com/a-service-members-at-fort-mccoy-wis-for-the-86th-training-divisions-combat-support-training-exercise-cstx-86-18-02-fills-a-water-tank-at-improved-tactical-training-base-liberty-on-

Figure 25 - Filling M149A1 Water Buffalo[2]

Figure 26 – Standpipe Hose[3]

north-post-on-aug-8-2018-the-86th-is-holding-the-exercise-as-part-of-the-us-army-reserve-commanding-generals-combat-support-training-program-thousands-of-service-members-with-the-army-as-well-as-other-military-services-and-foreign-militaries-are-participating-in-the-multinational-exercise-including-canadian-armed-forces-members-cstx-86-18-02-is-the-second-of-two-cstxs-by-the-86th-taking-place-at-fort-m-image218541597.html?imageid=7D23ADD4-DE29-445D-A5B2-5F209B22D886&p=725760&pn=1&searchId=0552ab94b97dc8d1ff6efee3a2cf3201&searchtype=0

[2] https://www.usmilitariaforum.com/forums/uploads/monthly_2024_09/Screenshot2024-09-23at21-01-23WaterWorks.png.a78205954b395f11a15d1e0aadbc071e.png

[3] https://itoldya420.getarchive.net/amp/media/us-marine-corps-lance-cpl-codi-heggemeier-2nd-medical-d523c0

Figure 27 - Filling M149A1 Water Buffalo from hydrant[4]

As seen in Figures 24, 25 & 26, the typical method of filling a water buffalo involves the use of what is known as a standpipe. A standpipe is a structure that allows the fill hose to hang down over the water buffalo. In Figures 24 and 25 the hose hangs just above the manhole cover. The fill hose in Figure 26 is longer and can be lowered into the water buffalo tank through the manhole cover. While not shown in the photo, Figure 27 shows filling a water buffalo with a fire hydrant.

Water Buffalo Tank Fill Time

Based on standpipe filling and using an online video that captures the entire fill process of an M149A2 water tank, it was possible to quantify the fill time for a 400-gallon buffalo tank regardless of the model of water buffalo. . Figures 28, 29, 30, 31 & 32 are frames from the video at the zero, one-quarter, one-half, three-quarters and full points. The filling of the 400-gallon tank took just over 2 minutes as demonstrated by the video, which equates to an average flowrate of 200 gpm. (https://www.youtube.com/watch?v=2juC4Ry9hS4&ab_channel=axeandsmash48g).

[4] https://www.nationalguard.mil/Resources/Image-Gallery/News-Images/igphoto/2000709524/

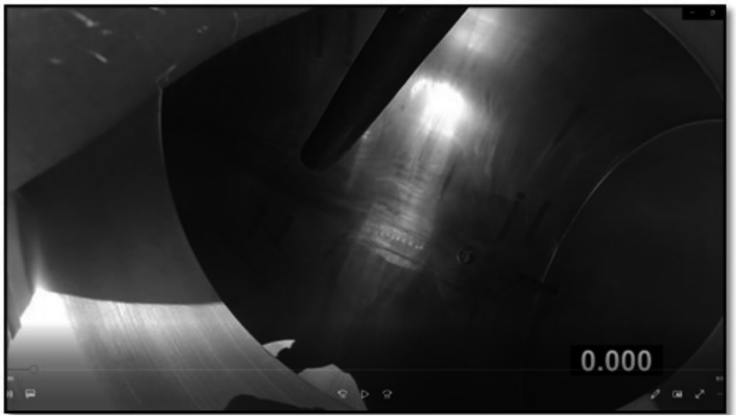


Figure 28 – 0 Full (T=0.0)

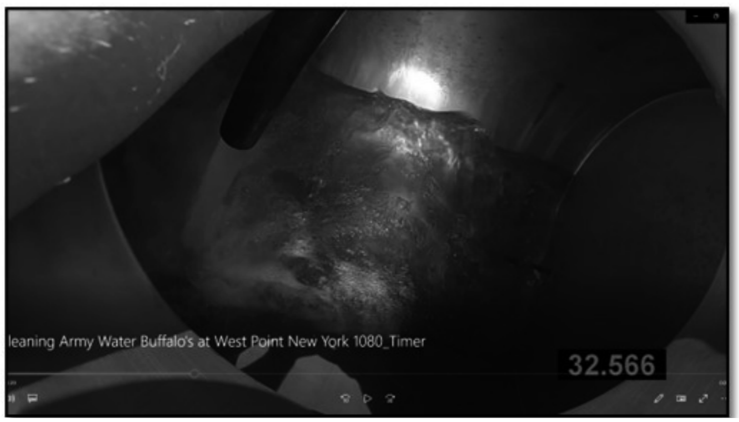


Figure 29 – ¼ Full (T=32.5)

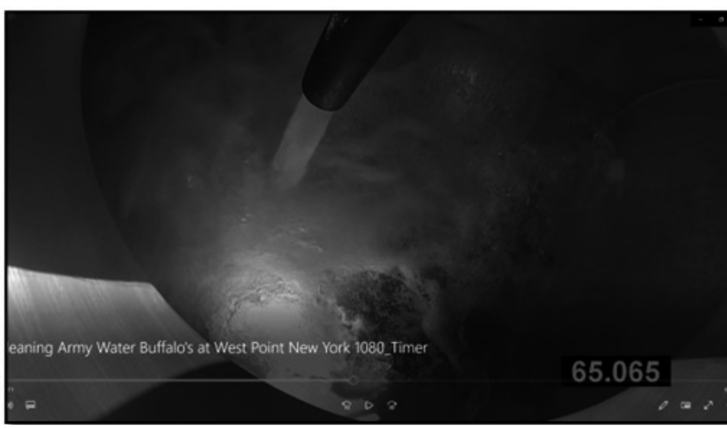


Figure 30 – ½ Full (T=65.0)

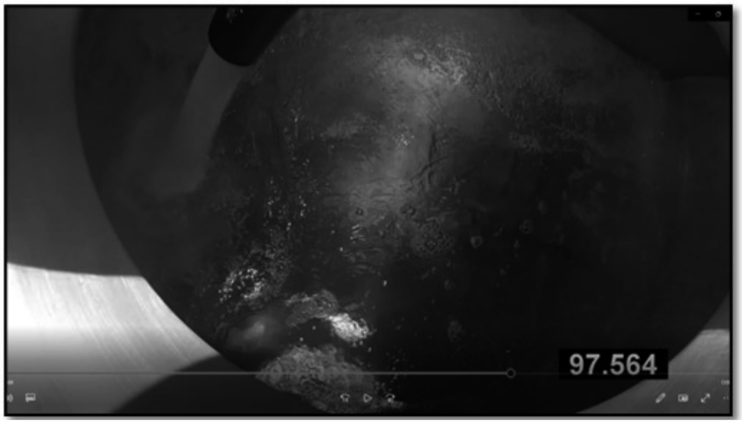


Figure 31 – ¾ Full (T=97.5)

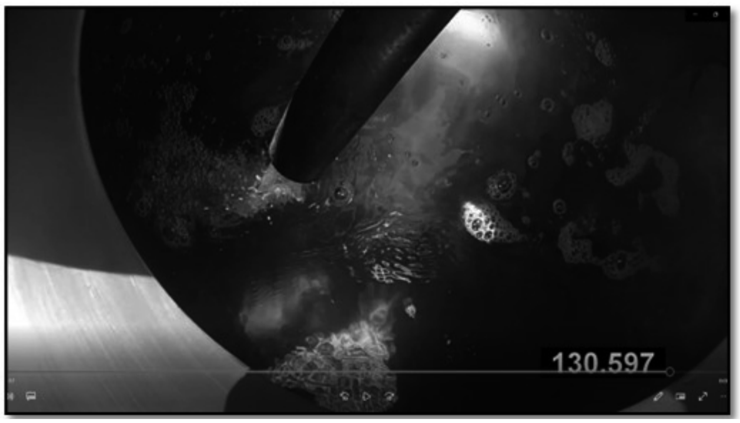


Figure 32 – Full (T=130.0)

As stated above, the fill time for a water source that provides a flow rate of 200 gpm was 2 minutes. The fill time is the ratio of volume (400 gallons) divided by flow (gallons per minute of the source). The chart below shows fill time would be for a 400 gallon at several source rates (Figure 33).

Source GPM	Fill Time (minutes)
100	4.0
150	2.7
200	2.0
250	1.6
300	1.3

Figure 33 – Tank fill times

Based upon distribution system testing performed by ATSDR in 2004, we have data that provide pressure and flow rates for the HPWTP. The graph below is from “Field Testing of Water-Distribution Systems at U.S. Marine Corps Base, Camp Lejeune, North Carolina, in Support of an Epidemiologic Study”. It provides system pressures at two different locations in the HPWTP system (Figure 34). These pressures combined with a 2 inch standpipe system are consistent with a 200 gpm flow rate.

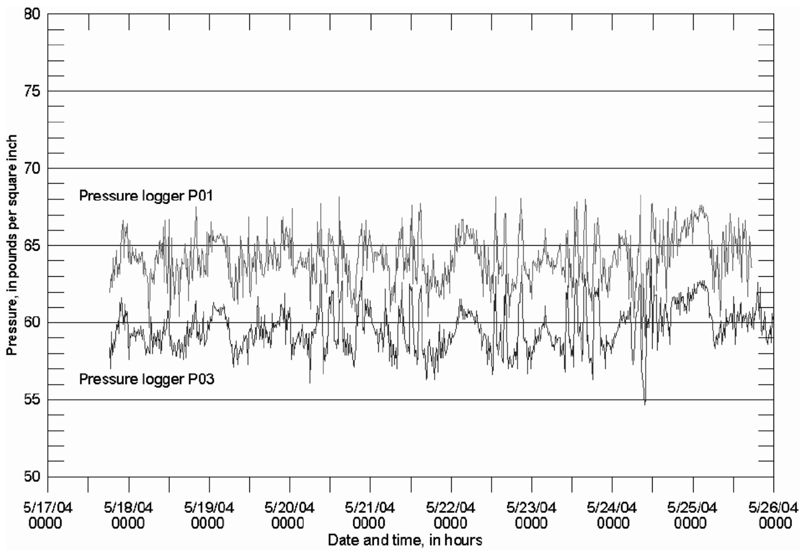


Figure 5. Graphs showing recorded pressure data in the Hadnot Point WTP area, May18–25, 2004 (refer to Figure 3 for hydrant locations)

Figure 34 – HPWTP Area Pressures (CLJ134936-CLJ134949)

The table below is from the same document. It provides flow rates at various locations in the HPWTP (Figure 37). These data confirm that HP WTP had more than enough capacity to fill the water buffaloes in the 2-to-3-minute range.

Table 3. Hazen-Williams C-factor Values for Holcomb Boulevard and Hadnot Point Water Treatment Plant Service Areas, August 2004

Test ID	Pipe Length, ft (m)	Nominal Diameter, in.	Flow, gpm	Pipe Material	Computed C-factor	Reference C-factor*
CF-H01	848	12	1,603	PVC	161	147
CF-H02	1,181	8	590	Cast iron	102	97–102
CF-H03	793	6	564	Cast iron	93	97–102
CF-H04	1,558	8	715	Cast iron	122	97–102
CF-H05	700	10	947	Cast iron	77	97–102
CF-H06	1,416	10	835	PVC	113	147
CF-H07	1,167	8	835	Cast iron	117	97–102
CF-H08	1,672	10	920	Asbestos cement	148	150

*Data from Walski et al. (2003)
1 in. = 2.52 cm; 1 ft = 0.3048 m; 1 gpm = 0.6309 L/s

Figure 37 – HPWTP Area Flow Rates (CLJ134936-CLJ134949)

Summary

Based upon my review of Dr. Hennet's and Dr. Brigham's expert reports, my review of documents produced in this litigation, and my research into the history and evolution of the water buffalo, I have reached the following opinions and conclusions:

1. From August 1972 forward the water buffaloes at Camp Lejeune, which would include the M107 (all types) and M149A1 & A2, were to be filled through the manhole cover.
2. Prior to August 1972, for filling convenience it is more likely than not that the water buffaloes at Camp Lejeune were filled through the manhole cover.
3. The M149A1 & A2 were not equipped with a filler neck, and the manhole cover was the only way to fill the tank.
4. The typical fill time for all 400-gallon tank water buffalos was more likely than not between 2 and 3 minutes when filled through the manhole cover using water supplied from a 2-inch standpipe directly tapped into a typical water distribution system.

Prepared by:

David Sabatini, PhD, PE, BCEE
January 14, 2024

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TM9-2330-213-14P Army Technical Manual (1990). BRIGHAM_USA_0000044016.

TM9-2330-267-14P Army Technical Manual (1981). BRIGHAM_USA_0000043121

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TM9-2330-267-14 Army Technical Manual (June 1971)

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TM9-875B Army Technical Manual (Oct. 1951).

Figure 9 - Photographs, M149, https://www.ebay.com/itm/223995969791. Last accessed January 14, 2025.

Figure 11 - Photographs, M149A1, https://www.bigiron.com/Lots/1968Army400-Gal2-WheelM149TankTrailer. Last accessed January 14, 2025.

Figure 24 - Photographs, Tank Filling, https://www.alamy.com/a-service-members-at-fort-mccoy-wis-for-the-86th-training-divisions-combat-support-training-exercise-cstx-86-18-02-fills-a-water-tank-at-improved-tactical-training-base-liberty-on-north-post-on-aug-8-

2018-the-86th-is-holding-the-exercise-as-part-of-the-us-army-reserve-commanding-generals-combat-support-training-program-thousands-of-service-members-with-the-army-as-well-as-other-military-services-and-foreign-militaries-are-participating-in-the-multinational-exercise-including-canadian-armed-forces-members-cstx-86-18-02-is-the-second-of-two-cstxs-by-the-86th-taking-place-at-fort-m-image218541597.html?imageid=7D23ADD4-DE29-445D-A5B2-5F209B22D886&p=725760&pn=1&searchId=0552ab94b97dc8d1ff6efee3a2cf3201&searchtype=0. Last accessed January 14, 2025.

Figure 25 - Photographs, Tank Filling, https://www.usmilitariaforum.com/forums/uploads/monthly_2024_09/Screenshot2024-09-23at21-01-23WaterWorks.png.a78205954b395f11a15d1e0aadbc071e.png. Last accessed January 14, 2025.

Figure 26 - Photographs, Tank Filling, https://itoldya420.getarchive.net/amp/media/us-marine-corps-lance-cpl-codi-heggemeier-2nd-medical-d523c0. Last accessed January 14, 2025.

Figure 27 - Photographs, Tank Filling, https://www.nationalguard.mil/Resources/Image-Gallery/News-Images/igphoto/2000709524/. Last accessed January 14, 2025.

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EXHIBIT 5

Rebuttal to Reports of Dr. Alex Spiliotopoulos and Dr. Remy J.-C. Hennet

Leonard F. Konikow

January 13, 2025

Qualifications:

I received a PhD in Geosciences from Penn State University in 1973, specializing in hydrogeology and groundwater modeling. I worked as a research hydrologist for the U.S. Geological Survey for about 42 years, and was the Editor-in-Chief of *Groundwater* journal for four years (2020-2023). At the USGS, I was mostly involved in the development, documentation, and application of groundwater flow models and groundwater solute-transport models. I was elected to the National Academy of Engineering in 2015. I am a Fellow of the American Geophysical Union and the Geological Society of America, which also presented me with their Meinzer Award for publications that have significantly advanced the science of hydrogeology. I have served on several Expert Peer Review Panels during my career, including those for ATSDR's Camp Lejeune groundwater modeling studies in 2005 and in 2009.

My curriculum vitae is included with this report as **Attachment A**, and a list of the publications I authored in the previous 10 years is included as **Attachment B**. I am being compensated at an hourly rate of $400 for my work on this litigation. I have not testified at a deposition or trial in the last 4 years.

Introduction:

ATSDR prepared reports describing models developed to simulate groundwater flow and contaminant transport at two areas of Camp Lejeune, North Carolina: Tarawa Terrace (TT) and Hadnot Point/Holcomb Boulevard (HPHB). Their use of the models was innovative in the sense that instead of a typical use of a groundwater model to predict future behavior, they used the model to "predict" how the system evolved in the past (before concentration observations were made) from a known state (an initial condition), in which no contaminants were present, to a contaminated aquifer with a mapped distribution in the early to mid-1980s when contamination was observed at a number of locations (wells, soil samples, and water treatment plants). ATSDR's use of groundwater models to reconstruct trends during a historical gap in concentration measurements is a legitimate and not unprecedented application of groundwater models. In fact, there are other publications in which doing this is documented and considered to be a normal and necessary part of the model calibration process, as discussed in more detail below. Modeling is the best and most logical approach for providing this information.

The ATSDR modeling work was reviewed and commented on by Dr. Alex Spiliotopoulos and Dr. Remy J.C. Hennet. In turn, I was asked to review the reports prepared by Dr. Spiliotopoulos and Dr. Hennet. This report presents my response, comments, and concerns about the technical content of Dr. Spiliotopoulos' and Dr. Hennet's reports. A list of the materials I have considered in rendering my opinions will be provided within seven days.

My opinions expressed in this rebuttal report are based on my review of the reports of Dr. Spiliotopoulos, Dr. Hennet, Mr. Maslia (Oct. 2024), Dr. Aral (Oct. 2024) and Jones & Davis (Oct. 2024), the ATSDR published reports, published literature, documents produced in this litigation, my work on the Camp Lejeune Expert Peer Review Panels, and my experience and expertise in the fields of hydrogeology and groundwater modeling. I hold these opinions to a reasonable degree of scientific certainty. I reserve the right to supplement and/or amend my opinions in this matter as necessary if additional documents or information are made available for my review.

Background comments about groundwater modeling related to DOJ Expert Reports

This section responds to the opinions of Drs. Spiliotopoulos and Hennet regarding the methodology used by ATSDR to reconstruct groundwater contamination, including their assertions that this methodology is novel, speculative and unfounded, and their repeated claims that this methodology cannot be used where there is limited to no historical data. (*E.g.*, Spiliotopoulos Report, pages 25-30).

A numerical computer model of groundwater flow and/or transport is a simplified representation of a complex reality. A model uses averages, approximations, and assumptions to simulate groundwater behavior and to reproduce its properties and characteristics. Because of uncertainty in defining aquifer properties and boundary conditions, groundwater models must be calibrated. Field observations of aquifer responses (such as changes in water levels for flow models and changes in concentration for transport models) are compared to corresponding model-calculated values. The objective of this calibration procedure is to minimize differences between the observed data and calculated values. The minimization is accomplished by adjusting parameter values within their ranges of uncertainty until a best fit is achieved.

Anderson and Woessner (1992) present a dichotomy of prevailing opinions about mathematical models:
1. "Models are worthless because they require too many data and therefore are too expensive to assemble and run. Furthermore, they can never be proved to be correct and suffer from a lack of scientific certainty."
2. "Models are essential in performing complex analyses and in making informed predictions."
They go on to conclude that "Although groundwater models are time-consuming to design and therefore expensive in terms of labor time, it is also true that use of a groundwater model is the best way to make an informed analysis or prediction about the consequences of a proposed action. … For these reasons, the bias of this book is, of course, toward opinion #2."

Groundwater contamination became widely recognized as a serious and pervasive problem in the 1980s. It is common that the existence of a groundwater contamination problem in a particular area would not be recognized until that contamination has migrated far enough and long enough that it affected a water-supply well or a surface water source. Then a monitoring program might be initiated. But this might not happen for several years to a few decades after the contaminant had entered the aquifer. Therefore, it is common that early-time data on concentrations are simply not available, as is the case at Camp Lejeune. Groundwater modeling is a widely recognized and accepted approach to understanding and managing these contamination problems. Models must be (and have been) calibrated in the absence of early time concentration data, as ATSDR has done. Other representative published examples where this has been successfully accomplished include the Rocky Mountain Arsenal, CO (Konikow, 1977) and Lawrence Livermore National Laboratory, CA (Rogers, 1992). In both of these cases, the early time history was reconstructed as part of the model calibration process (it just wasn't called "hindcasting").

In comparing hindcasting to forecasting, there are some similarities and some differences. In both cases, the analyst is using the model to estimate conditions during a time period outside of the calibration period, and both types of "predictions" have uncertainty associated with them. One difference is that for predictions of future conditions (forecasting), you can come back later and assess the accuracy of those model predictions. With hindcasting, that is not directly possible. Another difference is that with forecasting (predicting), future conditions are somewhat unbounded, so that uncertainty will tend to increase with time beyond the calibration period. With hindcasting, there is often a way to estimate initial or early time conditions, thereby putting a constraint or bound on uncertainty going back in time. While predictive uncertainty exists and must be recognized, hindcasting is an acceptable and reasonable way to use a calibrated model to assess groundwater conditions during a historical period when there were no observations.

"Hindcasting" was accomplished as part of a study of the Rocky Mountain Arsenal (CO) contamination problem, in which I developed and calibrated a groundwater flow and transport model (Konikow, 1977). The RMA began operations in or about 1943. A groundwater contamination problem was recognized in 1954 & 1955. No observations of concentration (chloride in this early case) were made until late 1955 to 1956. The model was developed to simulate the entire history of operation and contamination at RMA, starting in 1943, but no concentration data were available for the first 13 years of operation. Konikow (1977) made and described reasonable assumptions about the initial conditions, source locations, and source loading—but of course there was uncertainty associated with those estimates (as described by Konikow and Thompson, [1984]). The RMA model was calibrated using measurements made at four distinct times including 1956, 1961, 1969 and 1972. Work was documented and published in a 1977 USGS Water-Supply Paper (https://pubs.usgs.gov/wsp/2044/report.pdf), which received wide distribution. The RMA site became one of the first sites to fall under the Installation Restoration Program. Another example of reconstructing the early history of contamination migration was published by Rogers (1992) in *Groundwater* journal about their model calibration at the Lawrence Livermore National Laboratory site in California. In both of these earlier studies, the historical reconstruction wasn't called "hindcasting," but was considered a scientifically valid component of the model development and application.

Numerical simulation models of groundwater flow and transport processes in porous media are probably the most valuable single tool available to help analysts understand subsurface systems, integrate available data, evaluate conceptual models, and predict responses of groundwater systems to various stresses (such as pumping from wells and leakage or loading of contaminants into the subsurface environment). Groundwater flow models typically estimate the head distribution (equivalent to water levels, water table elevation, or potentiometric surface) in an aquifer system and how the head may change over time in response to changes in well locations or pumping rates. Groundwater transport models (solute transport or contaminant transport for dissolved chemicals) calculate how the concentration of a particular dissolved chemical will vary from place to place and over time. Groundwater systems are three-dimensional in nature, and their properties vary both horizontally and with depth. Therefore, groundwater models must typically be three-dimensional in nature. There is a large record in the published peer-reviewed literature of cases describing the development and application of models for complex real groundwater problems.

Contaminant transport in the subsurface is strongly influenced by the groundwater flow field. Thus, contaminant-transport modeling for a specific site requires a reasonably reliable groundwater flow model. If the contaminant is nonreactive or mildly reactive, the groundwater velocity (based on hydraulic gradients and effective porosity) is the primary control on advective and dispersive contaminant migration.

Comments about the distribution coefficient (K_d) and the retardation coefficient (R_f)

This section provides background information in support of my responses later in this report to Opinion 3 of Dr. Spiliotopoulos and Opinion 11 of Dr. Hennet regarding the methodology ATSDR used to calculate the retardation factor.

If a contaminant undergoes chemical reactions during the transport process, its net movement relative to the flow of groundwater may be slowed down. Such effects can be (and often are) represented in a simplified manner as a retardation process. Two parameters that are used to simulate retardation are discussed frequently in the comments by Dr. Spiliotopoulos. The contaminant transport conceptual model is that the migration of a contaminant may be slower than the average velocity of the groundwater in which it is dissolved because of adsorption to material in the aquifer. The net effect of this process is described by a so-called "retardation factor" (R_f), which is calculated as:

$$R_f = 1 + (\rho_b\, K_d)/\theta$$

where R_f = retardation factor; ρ_b = bulk density; K_d = distribution coefficient; and θ = porosity.

The model calculates R_f on the basis of the three parameter values on the right side of the above equation, all of which can vary in space and will include uncertainty in their estimated values. If ρ_b is estimated too high by 25% and K_d is too low by 25%, then the errors in those two estimates cancel each other out (i.e., they are compensating errors), and the net estimated value of R_f used in the model will be the same as if those two parameters were estimated precisely to their "true" values.

In general, the use of a distribution coefficient (K_d) as a component of a retardation factor in contaminant transport modeling in groundwater systems is a common modeling approach in simulating contaminant transport in aquifers, but one whose rigorous scientific basis is debatable. The K_d approach assumes that sorption of the PCE is instantaneous, reversible, and follows a linear equilibrium isotherm, and that "the solid matrix has an infinite sorption capacity" (Zhang & Bennett, 2002, p. 81). But in transport through complex heterogeneous porous media, the actual behavior of PCE would not match these idealized assumptions. Nevertheless, it is a simplifying assumption that can be useful in light of the uncertainties about the contaminant's distribution and reactive behavior. In effect, it represents an engineering approximation, which is why using a model calibration process to arrive at an approximate average value is an acceptable, reasonable, and common approach. Thus, Drs. Spiliotopoulos and Hennet's concern about precisely and accurately defining a value for K_d is misplaced because the theoretical underpinnings for this parameter are not rigorous. That is, conceptual uncertainty in its application must always be recognized, and this conceptual uncertainty carries forward to the use of a conceptually simple retardation factor in the transport equation. This theoretical uncertainty, however, does not preclude the use of these two parameters (K_d and R_f) for characterizing the average transport behavior of a contaminant such as PCE in flowing groundwater.

Zheng & Bennett (2002) describe some limitations in modeling sorption processes. They note that there are significant computational difficulties inherent in coupling advective-dispersive transport with chemical reactions (p. 79). They further note (p. 79-80) that "… field problems always involve uncertainty as to the nature of the controlling reactions, and as to the quantities and properties of the reacting substances. As a result, the biogeochemical processes represented in field-scale transport models at the present time are largely limited to reactions of the simplest kind, based on highly idealized representations of the effects of more complex reactions."

Kret et al. (2015) studied a Quaternary sandy aquifer to estimate sorption coefficients for PCE fate and transport modeling. They estimated K_d from both batch and column experiments and concluded that reasonable values for R_f for PCE are typically between 1.1 and 3.6.

Rogers (1992) developed a groundwater transport model for the Lawrence Livermore National Laboratory (LLNL) site in California, which includes "several hundred feet of complexly interbedded, unconsolidated alluvial sediments" with an upper boundary represented by an unconfined water table condition. Their calibration and history matching resulted in reasonable matches for R_f values between 1.0 and 3.0, with their conclusion that "a spatially averaged retardation factor of approximately 3 is recommended…"

<u>Model Documentation:</u>

To facilitate assessment of the scientific credibility and scientific defensibility of a groundwater model, the model study should be well documented. Reilly and Harbaugh (2004) state: "Because models are embodiments of scientific hypotheses, a clear and complete documentation of the model development is required for individuals to understand the hypotheses, to understand the methods used to represent the actual system with a mathematical counterpart, and to determine if the model is sufficiently accurate for the objectives of the investigation. … The appropriate level of documentation will vary depending on the study objectives and the complexity of the simulations."

Reilly and Harbaugh (2004) list ten topics that should be addressed in reports documenting model studies. These are:

1. Describe the purpose of the study and the role that simulation plays in addressing that purpose.
2. Describe the hydrologic system under investigation.
3. Describe the mathematical methods used and their appropriateness to the problem being solved.
4. Describe the hydrogeologic character of the boundary conditions used in the simulation of the system.
5. If the method of simulation involves discretizing the system (finite-difference and finite-element methods for example), describe and justify the discretized network used.
6. Describe the aquifer system properties that are modeled.
7. Describe all the stresses modeled such as pumpage, evapotranspiration from groundwater, recharge from infiltration, river stage changes, leakage from other aquifers, and source concentrations in transport models.
8. For transient models, describe the initial conditions that are used in the simulations.
9. If a model is calibrated, present the calibration criteria, procedure, and results.
10. Discuss the limitations of the model's representation of the actual system and the impact those limitations have on the results and conclusions presented in the report.

The documentation for the ATSDR model studies at Tarawa Terrace and HPHB study areas are detailed, comprehensive, and clear, and meet or exceed these guidelines, as evidenced by the series of model documentation reports that include 11 separate book chapters for Tarawa Terrace and 4 separate book chapters and 8 supplemental volumes for HPHB. Careful review of this comprehensive documentation indicates that ATSDR used scientifically acceptable tools and followed correct scientific methodology in performing its historical reconstruction, in contrast to the assertions of Dr. Spiliotopoulos and Dr. Hennet.

Review Comments on Dr. Spiliotopoulos' Opinions:

Opinion 1: Dr. Spiliotopoulos states "Due to the absence of sufficient historically observed data and site-specific parameters, the results of these calculations [in the ATSDR models] are highly uncertain and cannot be used for determining dose reconstructions at the level of detail that ATSDR presented in their analyses." I would counter that although early time data are lacking, there are still a lot of data and historical observations available, as documented in the several ATSDR reports on the investigations. Dr. Spiliotopoulos fails to specify how much data would be "sufficient". In any groundwater modeling study, there are never "enough" data and there is always uncertainty in the final model results. This is normal and expected. In this case, there were enough data to calibrate groundwater flow and transport models, and the data deficiencies were not so great as to prevent a historical reconstruction. In fact, a reasonable historical reconstruction was indeed accomplished, so it was possible. The historical reconstruction recognized the existence of uncertainty and assessed its impact on the results.

Dr. Spiliotopoulos refers to Section 4 of his report as his support for this opinion. Following are comments about his discussion in Section 4 of his report.

In the introduction to Section 4 (p. 27, para. 2), Dr. Spiliotopoulos overstates the lack of data for the Camp Lejeune groundwater system. He says that without site-specific data and a lack of observations, a model "can even be considered speculative and unfounded." That might be true if there were no site-specific data and no observations. But that is simply not true for these models. There are certainly site-specific data available on subsurface properties, as well as observations of heads, boundary conditions, and chemical concentrations for some time periods. These are all described in detail in the numerous reports published by ATSDR. There is no basis for applying the characterization of "speculative and unfounded" to the ATSDR models of TT and HPHB. Even for predictive periods, the system behavior simulated in the model still obeys the laws of physics and hydraulic principles, and contaminants will move in directions predictable by the hydraulic gradient, as calculated with the flow model.

In para. 3 (p. 27), he states that "'predictions' refer to model output, regardless of whether its results are used for hindcasting or forecasting …" I agree with this statement. However, in the next paragraph he discusses "When historical data are not available…" But whether the model predictions are used for forecasting or hindcasting, if it's truly a prediction, then there will be no measurements available (except later for a forecasting prediction). But at the time of model development, observation data for heads and concentrations will only be available during the calibration period. Implying that the lack of data during a predictive period is a problem is misleading. (If data were available during a historical period of interest, hindcasting would not be needed—it would just be used as part of the observed data set for the calibration period.)

In para. 2 (p. 29), Dr. Spiliotopoulos states that Dr. Clement (in Clement's 2011 publication) "indicated that ATSDR's analysis implied almost exact knowledge of past conditions." I disagree. I find that ATSDR is clear that uncertainty exists about the conditions during the historical reconstruction period, as well as during the calibration period, and the results include assessments of uncertainty. If Dr. Clement inferred that ATSDR believed they had an exact knowledge of past conditions, then that is Dr. Clement's mistake. In the same paragraph on p. 29, Dr. Spiliotopoulos quotes Dr. Clement's comments about the uncertainty analysis. Although the quote starts with Dr. Clement saying that "the results appear to be reasonable …", he ends the quote with an apparent criticism by saying: "The figure also shows that closer to the initial starting point the confidence band is almost 100%, implying that our knowledge of initial conditions, initial source loadings, and initial stresses is almost exact." Although it may be counterintuitive, as I discuss in my Introduction, I actually do have high confidence in the assumption that there were no (or negligible) contaminants in the groundwater from ABC Cleaners prior to Jan. 1953, and probably very little for at least several months after that. Thus, at some point the confidence band should get narrower going backwards in time towards the starting date of the simulation.

In his Summary of Opinion 1 (p. 30), Dr. Spiliotopoulos says "these models were largely not constructed using site-specific data …" I strongly disagree. The geometry and boundary conditions of the model and its hydrogeologic framework are derived from hydrogeologic and geophysical studies of the subsurface aquifer system at the Camp Lejeune and adjacent areas, as documented in USGS reports and in several of the ATSDR reports. This type of information provides a critical and necessary foundation for the models. The potentiometric and water table maps also provide important information for the construction and calibration of the models. Dr. Spiliotopoulos also states in this summary that the models were not "calibrated to observed data for the first 30 years of simulation." Of course, because those concentration data did not exist. That is the reason these models were built—to estimate those concentrations in a state-of-the-art way that is consistent with principles of groundwater flow and transport processes. The models did not generate arbitrary or random numbers. The results are based on the physics of groundwater flow and contaminant transport, and the results appear reasonable and realistic, and the existence of error bands or uncertainty ranges around the estimates is expected and openly acknowledged.

Opinion 2: Dr. Spiliotopoulos says that ATSDR used "parameters and assumptions that are incorrect or not representative of site conditions …" Parameter values for groundwater models are never known precisely and accurately. That is an unfortunate fact of life in groundwater modeling. The parameter estimation process (essentially, the model calibration exercise) is conducted to adjust parameter values within a range of reasonable values to yield a best fit between model simulation results and the limited observation data available. This naturally allows and/or creates compensating errors in the input data for the model. Dr. Spiliotopoulos says this results in conservative estimates of estimated monthly contaminant concentrations. It is not clear what is meant by "conservative" or why that is not a good trait. He also says the results are biased high. His main argument for that opinion seems to be that early (in time) results often lie above the mid-point of the uncertainty bands. The uncertainty bands reflect a zone within which results are expected 95% of the time; if results mostly fall within the uncertainty bounds, they should be considered acceptable. He cites sections 4.1.1 and 4.1.2 of his report for support of this Opinion.

On p. 31 (Section 4.1, 4th para.) Dr. Spiliotopoulos states "ATSDR's calibrated model sits at the top of the uncertainty range, … This demonstrates that the calibrated model was biased high." But it does not prove ATSDR's model is wrong. The results are within the uncertainty bounds and true values are expected to lie somewhere within the uncertainty bands. Furthermore, best estimates of concentrations do not have to lie at the center of the error band. A model may become insensitive to certain parameters used to create the error bounds at their upper or lower limits, and the response of the model to some parameter variations is not linear.

In para. 7 on p. 31, Dr. Spiliotopoulos quotes the NRC (2009) report where it says "Reporting precise values based on model predictions gives the misleading impression that the exposure of the former residents and workers at Tarawa Terrace during specific periods can be accurately defined." Would he prefer imprecise values? NRC gives no examples of where the ATSDR-reported values are too precise or are prone to misinterpretation in light of the pervasive discussions of model uncertainty provided by ATSDR in its reports. Furthermore, Dr. Spiliotopoulos fails to cite the first sentence of that same paragraph, where the NRC report states "The committee concluded that <u>ATSDR applied scientifically rigorous approaches</u> to address the complex groundwater-contamination scenario at Tarawa Terrace." [emphasis added.]

For Section 4.1.1 (p. 32), Dr. Spiliotopoulos uses the heading "Available data are limited to non-existent", but the first statement after that notes that there were 36 aquifer tests at TT to estimate aquifer properties. This is actually a lot of data, especially considering that aquifer tests are time-consuming and expensive to run. Data for TT are certainly *not* non-existent. I am sure many groundwater models have been developed for areas where there were less than 36 aquifer tests available.

In his summary of Opinion 2 (p. 33), Dr. Spiliotopoulos references his Fig. 5, which includes a reproduction of ATSDR's Fig. F16 about TT results, and goes on to say that ATSDR's work resulted in "biased high estimates." I reproduce that part of Dr. Spiliotopoulos' Fig. 5 (Fig. F16) here because it actually illustrates the opposite. It shows 5 measured PCE concentrations in samples from well TT-26 collected within weeks of each other in early 1985. Over this relatively short time span, the concentrations varied greatly (bracketed between a high of 1,580 ug/L on 01/16/1985 to a low of 3.8 ug/L on 02/12/1985)—a rate of change that cannot be replicated in a model using monthly time steps. Most importantly, the plot shows that the model results fell almost exactly at the midpoint of the range of observed values (about 800 ug/L)—countering the claim of the model being biased high.

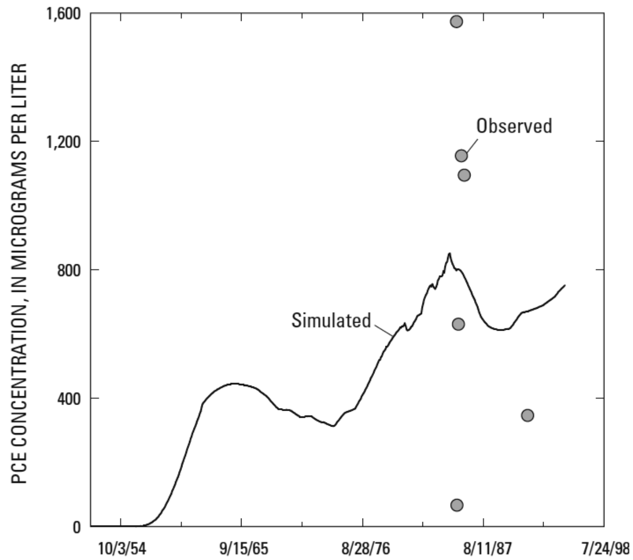

Figure F16. Simulated and observed tetrachloro-ethylene (PCE) concentrations at water-supply well TT-26, Tarawa Terrace, U.S. Marine Corps Base Camp Lejeune, North Carolina, January 1952–December 1994 (see Figure F6 for location).

Section 4.1.2, p.34, 1st para.: Dr. Spiliotopoulos quotes TT Chapter C (p. C38) saying that "… simulation results are unqualified for the years 1951-1977, …" This is a statement of recognition by ATSDR that there is a paucity of water-level measurements during that early time period. This is also part of ATSDR's consistent messaging that uncertainty exists, and is greater for some time periods than for other time periods. However, it does not disqualify or "unqualify" the model itself, as even during that same time period, other calibration controls and constraints exist in terms of boundary conditions and stresses. Specifically, the adjacent surface water systems represent hydrologic boundaries with known average elevations that change very little over periods of decades. Average monthly recharge can also be estimated based on precipitation and other climatic data that are available. Given such constraints, there is a limited range over which the simulated heads can vary, and that range is not unqualified or unconstrained.

In Section 4.1.2, p.34-36, Dr. Spiliotopoulos cites ATSDR (TT, Chapter F) as noting that 53% of comparisons of simulated to observed concentrations violated ATSDR's calibration target. But many of these samples were collected on the same day or within a short time of other samples (Figure 6 (Table F13), p. 35), so giving equal weight to each comparison is not statistically reasonable. These temporally closely spaced samples are not truly independent samples. Alternatively, I would say a fair comparison should be made on the basis of the quality of the agreement between simulated and observed concentrations at the 11 separate sampling (well) locations. This gives equal weight to every sampling location. Of these, 8 can be deemed "accurate" (including two that have some low and some high samples, so accurate on average), one is high but within the target range, one is slightly high, and one is consistently high (TT-23). On this basis, 73% of the sampling wells show reasonably and acceptably accurate simulation results. Also see my related discussion of calibration targets below (for Section 3.3).

On p. 36, para. 4, in his summary of Opinion 2, Dr. Spiliotopoulos states that the "model calibration did not rely on observed data prior to 1984." Yes, no contaminant concentration data were available then, and that is why ATSDR needed a deterministic groundwater simulation model to estimate how the contaminants were distributed in the aquifer during that time period.

Opinion 3: This Opinion notes that the calibrated model for TT was built using different parameter values and assumptions than the HPHB model. Dr. Spiliotopoulos cites sections 4.1.2.2, 4.1.2.3, and 4.2.3.2 of his report for support. In general, I note that these two study areas do not overlap. Although they are adjacent, and one would expect similar characteristics, having differences is not surprising and certainly the two independent calibrations can yield different values for the various parameters in the models. The models were also developed and calibrated at different times (TT being the earlier model) and improved calibration (parameter estimation) software was applied in developing the latter (HPHB) model.

Dr. Spiliotopoulos (Section 4.1.2.2.1, p. 37) indicates that an error was made in calculating the bulk density (ρ_b) for the TT system. Using an average value for total porosity of about 35%, he calculated that ρ_b should be lower, stating that "In the Hadnot Point model, this error was not repeated." That value was 1.65 g/cm^3. He states that "This has a significant impact on the calculation of the retardation factor, resulting in faster (sooner) arrival of PCE at the water-supply wells, …" However, as Dr. Spiliotopoulos himself admits, this significant impact on R_f does not actually occur because the calibration process compensates for an overestimate of ρ_b by estimating a value for K_d that appears to be too low. Recall that neither of these two parameters are used directly in the transport model. Rather, the retardation factor is used to calculate the migration velocity of the contaminant, and this retardation factor depends on the product of ρ_b and K_d. The calibration process yields a very reasonable value for R_f for PCE—a value (about 2.9) that is very consistent with values in other field studies reported in the literature (e.g., Rogers, 1992; Kret et al., 2015). In Section 4.1.2.3, Dr. Spiliotopoulos has a whole paragraph describing the erroneous consequences "if ATSDR had used a retardation factor of 6.44." But ATSDR did *not* use a R_f = 6.44, so this argument is irrelevant. In summary, the two specific possible errors cited by Dr. Spiliotopoulos for ρ_b and K_d largely offset each other, and have a minimal or negligible impact on the final results, as documented by ATSDR (CLJA_WATERMODELING_01-0000075468; ATSDR_WATERMODELING_01-0000887324).

Dr. Spiliotopoulos (Section 4.1.2.4, p. 39 and elsewhere) and Dr. Hennet (Opinion 11) raise concerns that site-specific data were not used to estimate total organic carbon (TOC) or to calculate K_d. TOC is used to estimate f_{oc}, which in turn is used together with an estimate of K_{oc} to estimate K_d, which in turn is but one factor in the equation used to estimate R_f. That is a long string of dependencies. Appendix A of Dr. Spiliotopoulos' report shows that reported values of TOC vary over a range of about four orders of magnitude. That is a huge variation and uncertainty, which is not accounted for. You cannot simply assume that the mean of that distribution of TOC values is the true and correct one to use to estimate K_d. Overall, there would be much less uncertainty, greater value, and more clarity in just estimating an average value for R_f as part of the calibration process, which is the methodology ATSDR employed. I believe that this is not optional and that R_f must be estimated during and in accordance with the calibration process. In light of this, it simply would not have mattered if K_d had been preliminarily estimated by ATSDR using highly variable site-specific measurements of f_{oc}/TOC. In the end, the value of R_f = 2.9 calibrated by the ASTDR modeling work is very close to other values reported in the literature for aquifers having similar geologic materials.

Dr. Hennet also criticizes ATSDR for failing to consider available site-specific data for f_{oc} (fraction of organic carbon) to estimate values of K_d (his Opinion 11). Rogers (1992, p. 51) in discussing the K_d parameter says "Numerous researchers have used theoretical methods correlating the organic carbon content (OCC) of the subsurface material and the K_d (Karickhoff, 1984). Others have used the partitioning between octanol and water to predict the K_d (Kenega, 1980). **These methods are not considered appropriate where the OCC is less than approximately 0.1%**." OCC is equivalent to TOC, and 0.1% is equivalent to a fraction or 0.001. Hennet's Expert report lists (Exhibit 3-2, and p. D-11 to D-12) 21 Camp Lejeune samples where f_{oc} is given. The median value is 0.0013, barely above the indicated limit, and 9 samples (43% of the samples) have values <0.001, indicating that the use of f_{oc} to estimate K_d is not appropriate. If ATSDR had used this approach, it would have introduced additional errors and sources of uncertainty.

In his summary of his Opinion 2&3 (p. 38-39), Dr. Spiliotopoulos states (in reference to ρ_b and K_d) that "parameter values in the Tarawa Terrace model were different than those used in the Hadnot Point model, even though both models simulated similar hydrogeologic conditions." This is not a problem, and it would be more surprising if they had applied identical values. The areas have similar conditions, not exactly the same conditions. Hydraulic conductivity measurements show notable differences between the two areas, reflecting local differences in aquifer material properties. These differences also cause differences in the factors contributing to the R_f. There is nothing wrong or unexpected about this. R_f was estimated in the calibration process, and the HPHB calibration used a different (and supposedly better) automated parameter estimation software package, which was not used in the TT calibration. So of course some differences will result. If they had applied the same parameter estimation software to both sites, it still would most likely result in different values for the average R_f in the two different areas. But the differences are small and inconsequential.

In a summary of his Opinion 3 (p. 39), Dr. Spiliotopoulos states that "these incorrect assumptions resulted in faster plume migration in the aquifer and estimated monthly concentrations that were conservative and biased-high." However, this would only be the case if the errors in the two parameters were considered separately and alone. But the model does not respond to these values separately. It responds to their net effect on the retardation factor, which was calibrated to a very reasonable value consistent with other peer-reviewed studies. The errors were compensatory and that compensation was built into the critical R_f value by the calibration process, as would be expected from a calibration process for a groundwater model.

<u>Opinion 4</u>: Dr. Spiliotopoulos says that use of "parameter values based on site-specific data … in Tarawa Terrace would result in substantially lower estimated monthly concentrations. Furthermore, the model uncertainty range would also be lower." Dr. Spiliotopoulos cites his Section 4.1.2.5 as support.

On p. 39, Dr. Spiliotopoulos argues that site-specific data for calculating K_d would result in a higher K_d value. Again, the model calibration process adjusted values of K_d, one component of the retardation factor, so that the value of R_f was as reasonable and accurate as possible for maintaining consistency with the available observed concentrations. Furthermore, in calculating K_d, Dr. Spiliotopoulos used a porosity value of 20%, which was the effective porosity used in the transport model. However, in calculating ρ_b, the other component of R_f, Dr. Spiliotopoulos used a porosity value of about 35%--a value representing the total porosity measured in two soil samples (p. 37). Using two different values for porosity in the same equation is inherently wrong, creating an inconsistency of 75%, and is done with no explanation.

In section 4.1.2.5, Dr. Spiliotopoulos develops a "revised" model using a late start date and a different K_d value. He presents his results in comparison to the ATSDR model results in his Figs. 7 and 8. He accentuates the early time differences by plotting results arithmetically rather than logarithmically. But that's a minor point. The proper start date is outside the scope of my opinions. But adjusting the K_d without also adjusting p_b is one-sided. In any case, Dr. Spiliotopoulos' value for R_f in the revised model is 3.48. The value of 2.93 used by ATSDR is only 16% lower than this new value used in Dr. Spiliotopoulos' revised model. This difference is relatively small. Furthermore, as seen in those two figures, the difference between the ATSDR results and Dr. Spiliotopoulos' revised model results are very small after approximately 1970. More importantly, both models are consistent in showing that PCE concentrations are above the MCL for most of the study period—and since Jan. 1, 1960 in both models, at both Well TT-26 and in influent to the TT WTP.

Also noteworthy in Dr. Spiliotopoulos' Fig. 7 is that for both models, there is a peak concentration shortly before 12/84. When K_d is higher and R_f is consequently higher, then one would expect that a peak moving through the groundwater system would be somewhat delayed, yet there is no indication in the results for Dr. Spiliotopoulos' revised model that this peak concentration was delayed at all. Instead, it appears to have arrived at TT-26 at the same time as in the ATSDR model. This demonstrates a lack of sensitivity to the value of K_d in this particular system. It simply did not make a significant difference.

Dr. Spiliotopoulos' only support for his opinion that the uncertainty range would be lower is a concluding statement in his Summary on p. 41, which states, "The uncertainty range for such historical reconstruction would also be lower, as it would be based on slower plume migration and lower concentrations for many years after the start of contaminant releases from the source." However, this is an inference that itself is not supported by analytics. Dr. Spiliotopoulos has not demonstrated that the uncertainty range would be lower. Dr. Spiliotopoulos' results also do not demonstrate significantly slower plume migration (peaks are coincident) or significantly lower concentrations (after 1970 they are almost identical—differing at TT-26 by an average of about 30 or 40 ug/L out of an average concentration of roughly about 500 ug/L—less than 10%).

Opinion 5: This opinion states that the ATSDR groundwater model for TT "resulted in biased-high estimates of monthly contaminant concentrations at one of the water-supply wells." The well in question is TT-23. Dr. Spiliotopoulos cites Section 4.1.2.6 of his report in support of this opinion.

Section 4.1.2.6 (p. 42) offers no clear evidence that the discrepancy at this one well (out of many) has a substantial impact on the overall results. Based on ATSDR Table E2, of the nine unique sampling dates for this well, six had an observed level of PCE or TCE above the MCL. Furthermore, with respect to the overall effect on concentrations estimated at the WTPs, it is important to note that TT-23 was operational for only about 9 months or less, starting in 1984, and had the shortest operational (pumping) period of any of the 16 pumping wells operating in the TT area (see Table H3 in Chapter H of the TT series of reports). When it was pumping, the contribution from this well provided only a small fraction of the total groundwater inflow to the WTP with concentrations far less than well TT-26 (with its modeled concentrations likely being underestimated). Thus, if indeed the estimates for this well were too high (by less than two times), the effect on calculated concentrations in the WTP would be minimal both in magnitude and in duration.

Opinion 6: Dr. Spiliotopoulos says that the ATSDR model did not reflect "observed data that indicated absence of contamination in the aquifer." Does he doubt that there was contamination in the aquifer? The presence of contamination in the aquifer is well documented; the absence of contamination in some locations means little overall—only that the contamination was not everywhere. That is normal. The statement and implication that there is no contamination in the aquifer is simply incorrect. The ATSDR reports clearly document observations where the contaminants were not detected (e.g., Table F13), and their analyses reflect that. Support for this opinion is stated to lie in Section 4.1.2.7.

In Section 4.1.2.7, Dr. Spiliotopoulos makes a major point about plotting non-detects, and he criticizes ATSDR for not plotting nondetects. He cites the reason as being that "non-detections listed as zeros are not visible in a logarithmic-scale scatterplot. This is because a logarithmic scale can only show numbers greater than zero." However, nondetects do not mean that the value is zero—only that it is less than the detection limit. In aiming to support his point, Dr. Spiliotopoulos relies on an analysis that is arbitrary, incorrect, and biased. He selects a value of 0.1 ug/L to represent all nondetects. For these samples, the detection limits were between 2 and 10 for most analyses. Helsel and Lee (2006) say: "The most common procedure within environmental chemistry to deal with nondetects continues to be substitution of some fraction of the detection limit. This method is better labeled as "fabrication", as it reports and uses a single value for concentration data where a single value is unknown. Within the field of water chemistry, one-half is the most commonly used fraction, so that 0.5 is used as if it had been measured whenever a <1 (detection limit of 1) occurs." If representing nondetects in a plot is to be done, a reasonable value and common way to represent a nondetect would be halfway between the detection limit and zero. For the Camp Lejeune data with detection limits of 2.0 and 10.0, the plotted position should be either 1.0 or 5.0 respectively (the latter being 50 times greater than the arbitrary value Dr. Spiliotopoulos used—so plotting 0.1 instead of 5.0 is a significantly misleading/biased-low way to present the data). This will make a big difference on his plot (such as his Fig. 18). Note: On this topic, Helsel and Lee (2006) also state: "All such plots [scatterplots using halfway points] are misleading, because unique censored values are unknown. Instead, left-censored data can be plotted as intervals between zero and the detection limit for each observation. In this way, no false statements about where an individual value is located, or that all such observations are at the same value, are made." There may also be other alternatives for plotting nondetects (newer and better, but more complicated). Regardless, Dr. Spiliotopoulos' selection of 0.1 to represent all nondetects is arbitrary, misleading, and wrong. ATSDR's approach of not plotting nondetects avoids the possible perception of "fabrication" and is more defensible than Dr. Spiliotopoulos' approach of assuming all nondetects can be fairly represented by an arbitrary value of 0.1, as shown in his Fig. 9 (p. 43). The discussions of Helsel and Lee (2006) justify the ATSDR's approach for not including nondetects on the data plots because of the risk of appearing to fabricate data or presenting misleading plots. ATSDR does show nondetects in all tables of measured concentrations.

In para. 1 (p. 45), Dr. Spiliotopoulos notes that the model results indicate a low value of 5.8 ug/L in well TT-54, but the observed value was a nondetect. He states that the calibration “is not supported by the non-detection in the sample collected in February 1985.” I would argue that it is indeed supported by that data. The detection limit for that analysis was 10 ug/L (TT Table F2). The halfway point between zero and the detection limit is 5.0, a value that is very close to ATSDR’s simulated value, and that close agreement is certainly supportive of the quality of the calibration.

Dr. Spiliotopoulos notes (p. 45) that “Well TT-54 had a reported non-detection in July 1991. However, the ATSDR model indicated an increasing concentration trend at well TT-54, suggesting that the PCE plume continued arriving at that well until that time. This is unlikely to be accurate.” However, if one examines the predevelopment and transient potentiometric surfaces (TT Chapters C and F), it is clear that TT-54 is downgradient from the ABC Cleaners, and that a plume evolving from that source while several water-supply wells are operational will likely contribute some contaminants to well TT-54.

Dr. Spiliotopoulos’ Summary of Opinion 6 (p. 45) picks two of the wells to generalize that “ATSDR’s model overestimated the plume migration extent and rate of migration, which were both conservative and biased-high.” This is an overgeneralization that ignores other wells and locations where estimates were very close or were underestimated. The nature of model calibration is that there will be compensating errors and that some simulated values will be too high and others too low. Certainly, the results for the flow model (e.g., Fig. C9) do not support a generalization that the flow model is inaccurate or biased-high.

<u>Opinion 7:</u> Dr. Spiliotopoulos states that “the presentation of results of the uncertainty analysis conducted by ATSDR for the Tarawa Terrace model was misleading by showing a narrow uncertainty range around the calibrated model.” Support is given in Section 4.1.3.1.

In 4.1.3.1, Dr. Spiliotopoulos’ characterization changes from “misleading” to “visually misleading.” The stated reason is that “they used a logarithmic scale, which visually compresses the uncertainty range around their calibrated model [results].” However, the use of a logarithmic scale is a valid and common approach in engineering and scientific studies, and is not characterized as being misleading by scientists and engineers. He observes that the plot ranges over six orders of magnitude on the axis for PCE concentration, but the width of the uncertainty bands do not. When values span such a large range, it is normal and standard to use a log plot. Using just an arithmetic scale would effectively hide all the changes in the lower part of the scale.

Dr. Spiliotopoulos states (p. 46, para. 4) that “the difference between the high and low values in Figure 11 [ATSDR’s Fig. I29] is not significant enough to justify the use of a logarithmic scale.” I disagree because the observed values span more than two orders of magnitude (excluding nondetects) and the simulated values span more than five orders of magnitude. Plotting these using a log scale is reasonable and informative, and is the only way to portray the early time results of the simulation in the same graphic. It is fine to also present these results plotted on an arithmetic scale (Fig. 12), but not sufficient to do so solely. Dr. Spiliotopoulos’ concern over the concentration plots is mostly cosmetic.

On p. 48 (para. 1), Dr. Spiliotopoulos criticizes the uncertainty analysis, saying "… the concentrations calculated by the model should be generally in the middle of the uncertainty range … However, the calibrated model-simulated concentrations are almost identical to the upper bound of the uncertainty range in the early years of operation (1957-1963)." However, if one examines his Fig. 12 (p. 48 of his report), it clearly shows that the results are indeed generally in the middle of the uncertainty range. In the few early years it is above the middle, but consistently below the upper bound, as desired. Such a result is within a probabilistic expectation. In those early years the concentrations are the smallest. For example, in 1960 the difference between the upper bound and the middle of the range is only about 10 ug/L, which is a small value on the full scale of PCE values considered. Being "generally near the middle" is not an objective or quantitative rule.

Opinion 8: Dr. Spiliotopoulos states that "ATSDR's uncertainty analysis was not bound by historical concentration data, and as a result, focused only on model precision and not accuracy in predicting COC concentrations. ATSDR's uncertainty analysis was presented as though it evaluated the model's accuracy. It did not." Support is stated as being in Section 4.1.3.2.

The criticism is based on the lack of historical data on concentrations prior to 1982 (Section 4.1.3.2, p. 49), and would mean that "the uncertainty analysis would result in precise but not necessarily accurate solutions …" However, once again, the lack of concentration data prior to 1982 is the reason that the model was developed. Data are available afterwards, and initial conditions for the contaminant distribution can be stated with reasonable reliability that the concentrations in the TT area were zero prior to the start of operations at ABC Cleaners. That is an important known concentration condition for the early 1950s. What the model does is estimate how the concentration changed spatially between the time of the start of ABC operations and the time when observations of PCE became available, and it does so in a manner that is consistent with the principles of groundwater flow field and solute transport, with the further recognition that the groundwater flow field has been simulated with acceptable accuracy.

The ATSDR assessed uncertainty using a sophisticated but standard and acceptable statistical approach—using a Monte Carlo simulation method. They carefully documented their approach, which generated 840 realizations. In a Monte Carlo simulation approach, no single realization is expected to be "accurate." Rather, the ensemble of realizations is intended (and expected) to bracket a range of feasible but realistic outcomes. The range of results (generally considering 95% of the outcomes) is a measure of the model's predictive accuracy. The Monte Carlo uncertainty analysis would not be expected to yield a different calibrated model.

In the last paragraph on p. 49, Dr. Spiliotopoulos states that "one of the most critical parameters for determining how fast contaminants will migrate in the aquifer is the retardation factor." I would argue that both the speed and direction of migration is more critically determined by the head distribution (hydraulic gradients, as determined by the groundwater flow model) and the effective porosity. The retardation factor will have no effect on the direction of transport of a contaminant for a given flow field. Furthermore, the results presented by Dr. Spiliotopoulos in his Fig. 7 show that the model results, at least at Well TT-26, are relatively insensitive to a range of uncertainty in the assumed value of K_d and R_f.

On p. 50 (para. 3), the Monte Carlo approach used by ATSDR is criticized by Dr. Spiliotopoulos "… because ATSDR implemented a 'probability distribution function' … to describe how values closer to the mean value of the range are more probable than those away from the mean." I do not see a problem here as this is an option within standard practice for random sampling of parameter values for a MC analysis when information or theory indicates that a parameter has a statistically normal or log-normal distribution. Zheng & Bennett (2002, p. 353) say "The Monte Carlo method is by far the most commonly used method for analysis of uncertainty associated with complex numerical methods." They further state (p. 356) "The heart of the Monte Carlo method is the generation of multiple realizations (or samples) of input parameters that are considered to be random variables. Each random variable is assumed to follow a certain probabilistic model characterized by its probability density function (PDF). The probability distributions commonly used in hydrogeologic studies include *normal*, *lognormal*, *exponential*, *uniform*, *triangular*, *Poisson*, and *beta* distributions." It is worth noting that when this book was published, co-author Bennett was an employee of SSP&A and first author Zheng was a former employee and affiliate of SSP&A.

The plots shown in Fig. 13 are discussed in para. 8 (p. 50, Section 4.1.3.2). Dr. Spiliotopoulos notes that the results of the calibrated model "sits at the upper bound of the retardation-factor uncertainty range." However, that is not true for the majority of the simulation period. It is close to the middle of the range during the period of 1962 through the end (around Dec. 1987). And prior to 1962, it still lies within the uncertainty bounds, which is acceptable and not indicative of bias. As stated earlier, error bounds need not be evenly distributed around the mean because a model can be sensitive to a parameter at either high or low values, but not both.

In the 3rd paragraph on p. 51, Dr. Spiliotopoulos presents the values for the retardation factor with four significant figures. Whether R_f is estimated by adjustments during model calibration or estimated from highly variable and uncertain site-specific data, presenting it with 4 significant figures is an unjustified and meaningless precision.

<u>Opinion 9:</u> This continues the previous discussion of the uncertainty analysis and cites the same section (4.1.3.2) as support. Dr. Spiliotopoulos says that the uncertainty analysis for TT "… did not encompass uncertainty bounds representative of site-specific conditions, resulting in biased-high uncertainty range."

It is not clear exactly what is meant by a "biased-high uncertainty range." If it means that the uncertainty range is incorrectly too high, that implies that the model is even more accurate than indicated.

On p. 52 and in Fig. 14, Dr. Spiliotopoulos discusses the results if R_f were 4.3 instead of 2.9. But this value of 4.3 is higher than those presented in published peer-reviewed articles of PCE transport in similar types of aquifer materials (Rogers, 1992, and Kret et al., 2015). Even with Dr. Spiliotopoulos' high value of R_f, Fig. 14 shows that after about 1970, the differences at Well TT-26 are small—less than 100 ug/L difference during the final 20 years of the simulation, with Dr. Spiliotopoulos' revised model showing lower concentrations because it includes a larger sorption rate. Again, it is relevant to note that the observed data shown in this figure range from about 3 ug/L to almost 1600 ug/L for samples collected over a relatively short time period in early 1985. The ATSDR model results fall very close to the midpoint at that time—at about 800 ug/L—not indicative of any bias. However, Dr. Spiliotopoulos' revised model with the higher R_f value calculated a PCE concentration of about 700 ug/L at the time when the data are available—lower than the mid-point, which does not provide evidence that the higher value of R_f is more accurate (actually, it's an indication that it is less accurate). Either way, the computed PCE concentration values are higher than the MCL for all times after 1960, which is a critical point.

The three highest observed values of PCE in well TT-23 were underestimated by the ATSDR model, which counters the claim that the ATSDR model is biased high.

On p. 55, Dr. Spiliotopoulos says that "ATSDR's selection of the retardation factor parameters forced the calibrated model to simulate fastest arrival of PCE at well TT-26 …" This use of the word "forced" appears to unfairly attribute an unscientific and biased motive to the way the model calibration was conducted. First of all, this was not the fastest possible arrival. If they had used a value of $R_f = 2$, the arrival would have been faster than the value they calibrated to. I think a fairer way to characterize the calibration relative to R_f is that they varied the values of R_f and of other parameters and selected parameter values that yielded the best overall fit to the available data. This happened to be a value of 2.9 for R_f, which was very consistent with other values reported in the literature for PCE transport in similar types of geologic material.

Opinion 12: This opinion focuses on the model post-audit performed by Jones and Davis. The opinion says that the post-audit showed that "ATSDR's dose reconstruction groundwater model for drinking water in Tarawa Terrace used parameters and assumptions that resulted in conservative and biased-high estimates of monthly contaminant concentrations." Support is said to be given in Section 4.1.5.

It is my understanding that Jones and Davis, as well as Maslia, will respond to this opinion in their rebuttal reports. A few general comments about the content of section 4.1.5 follow.

In Section 4.1.5.1 (p. 60, para. 2) Dr. Spiliotopoulos states that "Observed concentrations of zero correspond to non-detections." As mentioned previously, this statement is not accurate in the sense that nondetect values do not necessarily have a value of zero, but their value may be anywhere below the detection limit for that particular analysis. Also, in para. 3 and Fig. 18 (p. 60), Dr. Spiliotopoulos repeats the same error in assuming that a nondetect can be substituted by a value of 0.1 ug/L. This is arbitrary and biasing.

Dr. Spiliotopoulos calculates a mean error for partitioned segments of the data set—separately for points where the observed value is higher and separately for points where the simulated value is higher. This is not a common or standard way to compute a mean error. Based on my experience and expertise, the standard methodology is to compute the mean error for all data.

Opinion 13: This opinion also focuses on the model post-audit performed by Jones and Davis, and is closely related to Opinion 12. It suggests what Maslia and Aral should have done with the data of Jones and Davis. Support is again said to be given in Section 4.1.5. It is my understanding that Maslia will respond to this opinion in his rebuttal report, but I have a general comment regarding the absence of data.

On p. 63, Dr. Spiliotopoulos expresses concern that "no data are available to evaluate whether the overall extents of the simulated plume are real." Some data are certainly available. It would be nice if more data were available. If extensive data were available to map the plume in detail over time, there would be little need for a simulation model. The ATSDR models reliably simulate the groundwater flow field and head distributions so that the transport models can simulate advective and dispersive processes, as modified by chemical reactions and adsorption (as simplified using the retardation factor), to fill in the gaps in the observational database in a way consistent with widely accepted governing principles of groundwater hydraulics and transport phenomena. This is a reasonable and appropriate approach to addressing this issue.

<u>Opinion 14:</u> This opinion restates previous ones, but for Hadnot Point, and says that the ATSDR model "was constructed and calibrated using parameters and assumptions that are uncertain or incorrect." Support is said to be given in Sections 4.2.1, 4.2.2, 4.2.3, and 4.2.4.

In general, groundwater systems occur within subsurface geologic frameworks that are complex, heterogeneous, and hidden from view. There are and always will be uncertainty associated with even the best efforts to define the properties and relevant characteristics of these systems. This does not preclude the development of reliably sound numerical models to simulate groundwater flow and transport processes. But model developers must always be aware of, and assess, the existence of uncertainty and the sensitivity of the model results to this uncertainty. ATSDR has indeed accomplished this. For TT, they have produced a 187-page chapter (Chapter I) solely about this task (in addition to many discussions of it throughout the other chapters). For HPHB, there are two sections in Chapter A of their reports focused on these topics.

Dr. Spiliotopoulos states (p. 68, para. 4) that "Unlike the Tarawa Terrace model, ATSDR did not know the precise location of all contamination sources and the magnitude of contamination each source contributed." This is true—there is uncertainty in the source terms (as with all model parameters). But that can be handled and does not preclude the development of a reasonable flow and contaminant transport model. Assumptions had to be made, but they were not "arbitrary" and were clearly and comprehensively documented. He cites the NRC (2009) report, which said "There were multiple sources of pollutants, including an industrial area, … [etc.]" What is certain is that all of these are likely sources of groundwater contamination. Industrial operations in the 1950s, 60s, and 70s were typically not concerned with protecting groundwater quality.

In footnote 235 (p. 68-69), Dr. Spiliotopoulos says, "ATSDR used simulated contaminant concentrations in the influent to the WTP to calculate concentrations in the water delivered to a family housing or other facility, without considering any contaminant losses during treatment." However, unless the treatment process was designed to treat these contaminants, it would have been "arbitrary" and highly uncertain to simply assume that the treatment reduced contaminant concentrations or removed contaminant mass.

p. 69: Dr. Spiliotopoulos cites "evaporative" losses in a treatment plant. However, evaporation is rarely significant in a water treatment plant and direct evidence would be needed to support this hypothetical claim. Contaminant loss due to volatilization during the treatment and distribution process was discussed at the March 28, 2005 expert panel meeting where panelists—including Dr. Pommerenk of AH Environmental— opined that any loss would be minimal (See March 28, 2005 Expert Panel Meeting Transcript at 55:2-57:14, 56:2-57:14).

In para. 3, Dr. Spiliotopoulos says “Based on [his] professional judgment, there was insufficient data to conduct groundwater flow and contaminant transport model calibration and uncertainty analysis.” But in fact, ATSDR did “conduct” it, and clearly documented their calibration and uncertainty analyses. In my professional judgment, they did a good job with the limited data available.

In para. 4 (p. 69), Dr. Spiliotopoulos repeats that “prior to 1982, no water quality data were available …” However, groundwater flow directions can be deduced with typically small uncertainties, and flow rates (velocities) and advective-dispersive transport can be simulated with some additional uncertainty, but these key processes are reasonably well defined. Also, it is highly certain that prior to the start of these industrial and landfill operations, the contaminant concentrations were zero—an important early-time data point.

In para. 7, Dr. Spiliotopoulos quotes NRC (2009) as saying “simpler modeling approaches should be used to assess exposures from the Hadnot Point water system.” While this is easy to say and sounds appealing, they don’t say how to do that or what simple modeling approach would work. How does one know if a model is too simple? What processes should be eliminated in the simpler model? In fact, the way to produce a simpler model is to first develop and calibrate a maximally realistic “complex”, detailed, and comprehensive model that can be then used to assess which processes or factors have little effect on the results and so can be safely eliminated to produce a simpler model. The benefit cited by NRC is faster and more efficient modeling, but that potential benefit is not a major need here, and the use of models that might be too simple is offset by their reduced realism and risk of oversimplification.

On p. 70 (section 4.2.1), Dr. Spiliotopoulos says “available data are limited or non-existent” but in the first bullet point states that “more than 200 aquifer and slug test analyses” exist. This is a lot of data! There are many groundwater models that have been developed and calibrated on the basis of much fewer hydraulic testing at the specific site of interest.

On p. 70, Dr. Spiliotopoulos is also concerned that pumpage data for individual wells were estimated on the basis of “ancillary data.” This is common standard practice in groundwater modeling, as pumpage measurements for wells are often not available or are of questionable quality.

In the last para. (p. 70) Dr. Spiliotopoulos notes that the HP WTP was built in 1942 and during its first 40 years of operation, there were no water quality data for the contaminants of concern. This is unfortunate, but not unexpected; it is rather common for groundwater contamination problems that a chemical that turns out to be problematic at a later date is not monitored prior to that awareness. This is why ATSDR had to use modeling to help reconstruct the historical record as well as possible, using documented quantitative methods. Of course, there will be uncertainty in the results, but they seem reasonable given the information that is available.

p. 71, Fig. 25 (ATSDR Fig. A18): Dr. Spiliotopoulos presents four plots of simulated and observed TCE concentrations at four wells in the HPHB study area. All four plots show that the simulated values were either close to the middle point between observations (HP-602 and HP-608) or below the observed values (HP-634 and HP-601/660). There is no indication here that the model overestimated concentrations (or was biased-high).

In summarizing Opinion 14 (p. 71), Dr. Spiliotopoulos says “Selection of model parameters was based, primarily, on professional judgment.” This is always the case. Data are always limited, and professional judgment is required to assess how to deal with that paucity of data and how much weight to give the limited number of measurements. A groundwater modeler always wishes they had more data, but the reality is that there are never so much data available so as to avoid using professional judgment.

In Section 4.2.2 (p. 72) the claim is made that ATSDR "made arbitrary assumptions to reconstruct pumping history …" In my opinion, the assumptions were not arbitrary, but rather were well-informed, well-reasoned, and carefully documented. Assumptions had to be made about the pumping history, and they were made, but they were not arbitrary. For example, Dr. Spiliotopoulos notes that "Yearly volumes are available for some years prior to 1980. A trendline was used to estimate raw-water flows for years prior to 1980 when no data exist." This appears to be a sound statistical approach, and the use of a trend line is certainly not arbitrary.

In Section 4.2.2 (p. 72-73) Dr. Spiliotopoulos offers a further criticism that "it was assumed that a well would be operated in the historical period based on a pattern similar to the more recent 'training period,' with further adjustments to account for information on the varying capacity of wells, where available." Dr. Spiliotopoulos' statement actually contradicts his assertion that estimates were arbitrary. Here he describes a reasoned and reasonable approach to estimating a pattern of past water use (well pumpage)—an approach that is not "arbitrary."

In several additional paragraphs on p. 73 (as well as elsewhere), he repeats the claim that pumping rates were based on arbitrary assumptions. ATSDR uses sound statistical methods (such as regression and correlation) to estimate pumpage. This is neither arbitrary nor unreasonable. Similar wells managed by the same operating authority are likely to have been operated in a similar manner. If not, that would be arbitrary. It is unlikely that Dept. of Navy engineers operating the well fields did so in an arbitrary manner. In the early years they just weren't required to maintain as detailed records as would be expected today. Again, ATSDR made reasonable assumptions with the data that they had available.

Near the top of p. 77, Dr. Spiliotopoulos states that model calibration was "improperly influenced" by "erroneous concentrations reported for well HP-634 … while non-detections were ignored." It has not been established nor agreed that erroneous concentrations (actually, one single value) were reported for well HP-634. This is discussed in more detail below in reference to Section 4.2.3.3. Non-detections were not ignored. They are clearly listed and labeled in many tables presented in the ATSDR reports (such as Table A4 in Chapter A of the HPHB report series, and in many other places too).

In Section 4.2.3.1 (p. 77) Dr. Spiliotopoulos claims that "The groundwater flow model has significant limitations in the absence of data for calibration." Although the model has limitations, there is no evidence that the limitations are significant for the purposes that the model was developed. Furthermore, there is not an "absence of data for calibration." In the very next paragraph, Dr. Spiliotopoulos notes that more than 700 water-level measurements were used in calibrating the predevelopment model, which is also the initial conditions for the transient groundwater flow model. Also, there are a lot of data available on the boundary conditions and hydrogeologic framework for the model.

In the 6th paragraph (p. 77), Dr. Spiliotopoulos indicates that the simulation of contaminant transport in the aquifer is inherently uncertain. This is true for all groundwater models. But the uncertainty does not mean that the model is not useful.

In Section 4.2.3.2, p. 78, Dr. Spiliotopoulos notes that ATSDR recognizes that explicit data defining source locations and mass loadings are not available, but then he criticizes ATSDR by saying "these quantities were arbitrarily assigned to the model in order to fit the limited water-quality data available starting in 1982." However, by criticizing ATSDR's methodology, Dr. Spiliotopoulos in effect is criticizing the essence of the model calibration, history matching, and parameter estimation process practiced in groundwater modeling, in which parameter values are adjusted (either manually or automatically) in order to improve the fit (e.g., see Hill and Tiedeman, 2007). Furthermore, the source locations and mass loadings were not "arbitrarily assigned." The general locations of the sources are well-documented, and sources were placed in the vicinity of these documented locations. Consistent with principles of model calibration, the exact placement and strength of these sources were varied within limits until the observed concentrations were reasonably matched by the model. The variation in the exact location, timing, and strength of sources is rarely known, and adjustment of source properties is a commonly-accepted part of calibrating a flow and transport model.

p. 79: Dr. Spiliotopoulos discusses the lack of data to define the source loading terms for the model in the HPHB area. However, there is no doubt that these chemical contaminants (including TCE and PCE) were present in the groundwater at toxic concentrations (above the MCLs) in the HPHB area, and that they were pumped out of the aquifer by several operating water-supply wells.

p. 79: In the summary for Opinion 14, Dr. Spiliotopoulos criticizes the ATSDR for having "assumed constant mass loading of the same magnitude at all sources for more than 40 years", which he characterizes as "highly uncertain, if not impossible." Viewed from a different perspective, what ATSDR did was apply an average rate over the critical time period because there was no basis for differentiating how the loading might have varied over time. In my opinion, this was a reasonable approach. Furthermore, the constant source resulted in a reasonable model calibration, and so there was no reason to incorporate a variable source in the absence of data on transient source characteristics.

Opinion 15: In this opinion, Dr. Spiliotopoulos repeats the claim that ATSDR included an erroneous value in its analysis and model calibration (presumably for the 1,300 ug/L value measured in a sample from HP-634). Section 4.2.3.3 is cited for support.

In Section 4.2.3.3, Dr. Spiliotopoulos argues that concentration data for well HP-634 was incorrectly interpreted and that the reported value of 1,300 ug/L on Jan. 16, 1985 "should be considered erroneous" (although he considers other samples from that well that showed non-detects to be valid). I believe that his basis for this conclusion is speculative and unsupported by facts, as discussed below.

On p. 80, Dr. Spiliotopoulos says "it is unlikely that this well [HP-634] was ever contaminated with elevated TCE concentrations," and he and Dr. Remy Hennet argue that the analysis showing a concentration of 1,300 ug/L should be thrown out. Although Dr. Spiliotopoulos and Dr. Hennet claim the well was shut down permanently, documentation suggests that HP-634 was online in January 1985 (see CLJA_CLW00000004559, CLW4546, and CLW1818). However, even if the well was shut down permanently shortly before the date this sample was collected, I strongly disagree with Dr. Spiliotopoulos' argument that "contamination could not have reached that well when it was non-operational." It is plausible and possible that TCE could have reached the well sometime after the previous sample had been collected. As Dr. Spiliotopoulos surely knows, after a pumping well is shut off, water levels do not instantly recover and the head distribution does not instantly return to a nonpumping configuration and nonpumping hydraulic gradients. During predevelopment (nonpumping steady-state) conditions, flow near HP-634 is predominantly to the west and southwest (see HPHB reports Fig. A19 for 1951, reproduced below). While this well was operational, a cone of depression (a drawdown of water levels) formed around it, lowering the heads and reversing local hydraulic gradients, and enabling the movement of contaminants from nearby areas containing contaminants west of HP-634 to move eastwards towards HP-634 (as also shown for later times in Fig. A19 below). When a well is shut down, the heads take time to recover (recovery is not instantaneous). During the slow recovery period, water and contaminants will continue to move towards the well while the cone of depression is slowly filled in and recovers. This simple normal response of groundwater systems to the cessation of pumping easily explains the presence of contaminants in a sample collected after the pumping was stopped. Note that concentrations of DCE and VC were also unusually high in this same sample, so the TCE value is not an isolated “outlier” (see table C7 in report Chapter C). This progression is seen in the maps for all three layers for the November 1984 maps shown in Fig. A19 below, where the contaminant is shown to have moved very close to HP-634 from its previous location in the industrial area just to the west. If Dr. Spiliotopoulos argues that it is not possible for contaminants to reach HP-634 once its pump ceases operation, then it is contingent on him to provide some evidence that (a) the recovery is so fast that it is irrelevant (i.e., how long would it take for the hydraulic gradients to reverse again and return to a predevelopment condition?), and (b) that the contaminants were so far from HP-634 when it was shut off that it could not have migrated that distance during the recovery time. Without such calculations or evidence, one can conclude that it is indeed possible for contamination to reach that well shortly after it became non-operational. The primary evidence that it did become contaminated is the measurement of 1,300 ug/L in the January 1985 well sample, and I do not see conclusive evidence that that sample analysis should be discarded.

Dr. Hennet argues that this well was not contaminated by TCE because some vials in the shipment were broken (he does not say the samples for this analysis were in broken vials, so the relevancy of other vials being broken is not apparent). I doubt that the lab would or could perform an analysis or report a value on a sample taken from a broken vial. Dr. Hennet says a CCLJ report shows the value as 10 ug/L. However, the lab that did the analysis reported 1,300 ug/L. Hennet and Spiliotopoulos also say that the value of 1,300 is an outlier, so should be discarded. But there are many high-valued “outliers” in the record, and the record shows other instances where the value can change over similar large magnitudes in a very short time (e.g., TT-26 shown in Fig. F16, where the PCE concentration changed from 1,580 to 3.8 ug/L in successive samples collected just 4 weeks apart, mirroring the change in HP-634 from ND to 1,300 ug/L in a similar 4 week timeframe). The reasoning by Dr. Spiliotopoulos and Dr. Hennet to discard this reported value seems entirely speculative. They offer no actual evidence that the analysis or its reporting was erroneous.

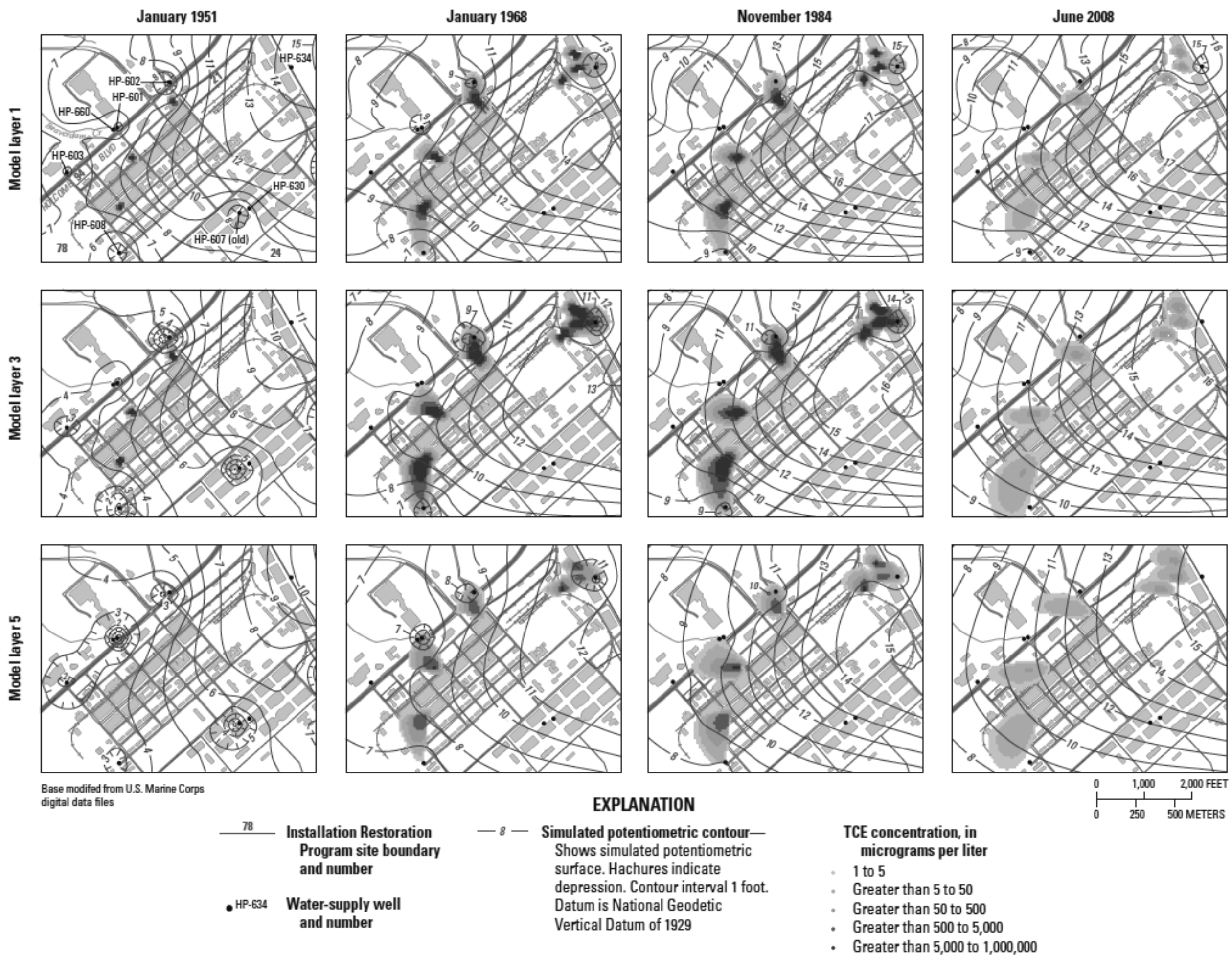

Figure A19. Reconstructed (simulated) water levels and distribution of trichloroethylene (TCE) within the Hadnot Point Industrial Area fate and transport model subdomain, model layers 1, 3, and 5, Hadnot Point–Holcomb Boulevard study area, U.S. Marine Corps Base Camp Lejeune, North Carolina, January 1951, January 1968, November 1984, and June 2008. (See Figure A13 for location and building numbers; see Appendix A4 for more detailed maps and results.)

On p. 81, Dr. Spiliotopoulos presents his Fig. 31 plotting of TCE concentrations in HP-634. However, he purposely does not include the data point with the value of 1,300 in his plot; including it would yield a very different picture, and show a much better match between simulated and observed TCE at the well location. TCE is found to be present in many locations immediately adjacent to HP-634, as seen in Fig. C33 (reproduced below). HP-634 is within the industrial area HPIA in that map (close to its northeastern boundary).

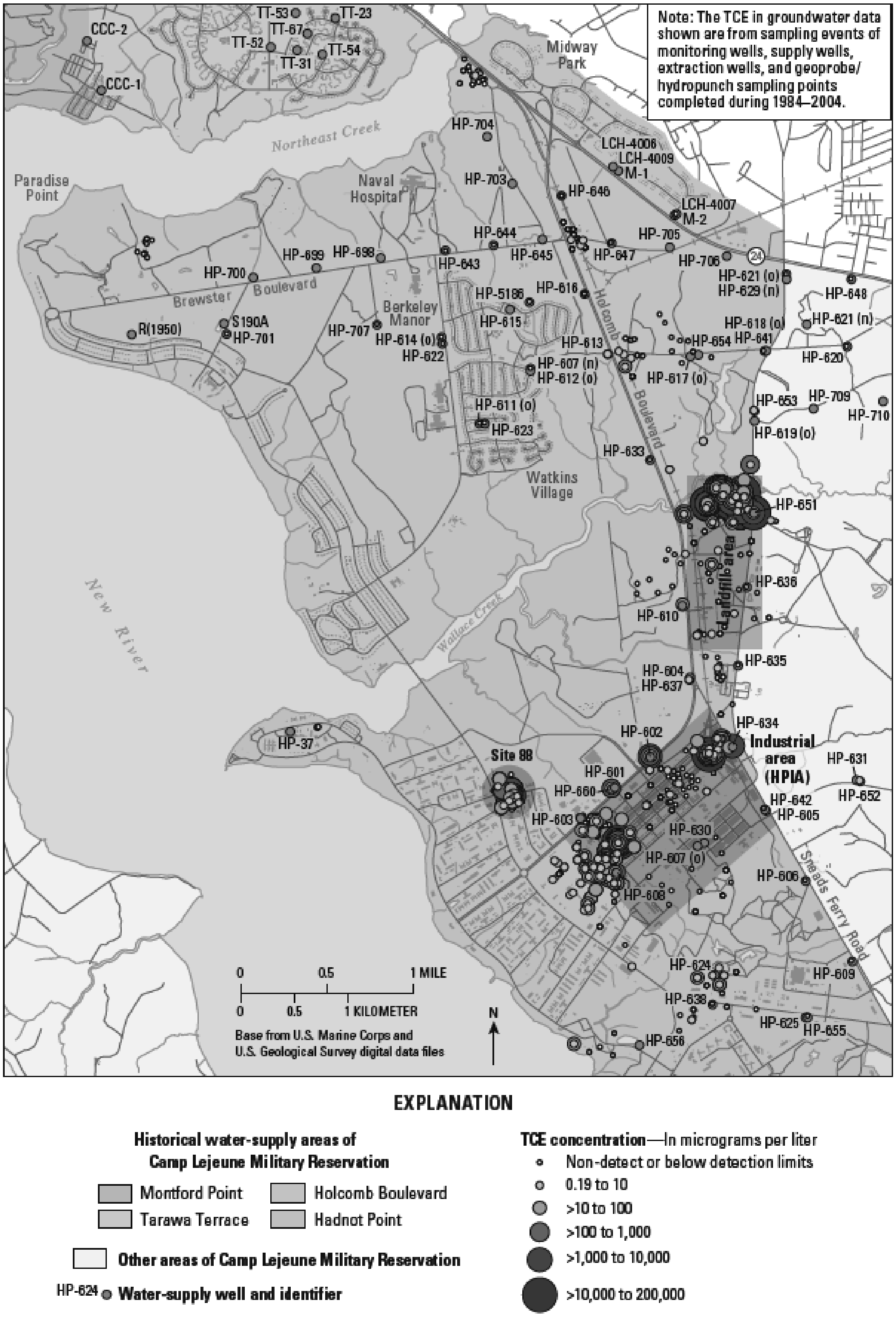

Figure C33. Groundwater sample locations for trichloroethylene (TCE) and ranges of TCE concentration in monitor and supply wells within the Hadnot Point–Holcomb Boulevard study area, U.S. Marine Corps Base Camp Lejeune, North Carolina.

Opinion 16: Dr. Spiliotopoulos argues here that the model for VOC degradation products was based on limited data, and "ATSDR's historical reconstruction prior to December 1984 cannot be verified." He cites section 4.2.4 as support.

In section 4.2.4 (p. 82-83), Dr. Spiliotopoulos states that "As illustrated in Figure 33 [ATSDR Fig. A25], the historical reconstruction prior to 1985 cannot be verified, due to lack of observed data for the period." This is true, and it is the reason why a simulation model was needed and was developed. For the four contaminants shown in Fig. 33, the agreement between simulated values and observed data is excellent in all four plots. This close agreement when observations are available builds confidence in the reliability of the model and its predictions, including for the hindcasting results for times prior to 1985.

In the summary for Opinion 16 (p. 83), Dr. Spiliotopoulos repeats that "… such data were not available prior to December 1984. Therefore, the estimated monthly contaminant concentrations cannot be verified." Again, the whole point was to use a technically sound model, which would be calibrated to available data in and after 1985, to estimate the values during the 15 or so years prior to that calibration period to inform the epidemiological studies. For PCE and TCE, the fit with the LCM model was actually slightly better than with the MT3DMS model, which was not designed to simulate degradation products. The quality of that fit is illustrated in Figure A25.

Opinion 17: Dr. Spiliotopoulos says that "the sensitivity analysis for the various contaminant sources in Hadnot Point indicated that the timing of source-release start date is uncertain and, therefore, it is impossible to determine the historical period that contamination was present in groundwater." The conclusion of this sentence does not follow from the precedent. Of course there is uncertainty in the timing of the release. That is well known. But the uncertainty does not make analyses impossible. Also, the uncertainty is not unconstrained. The model helps constrain the reconstructed history as it incorporates the physics of groundwater flow and solute (contaminant) transport. It is *not* impossible "to determine the historical period that contamination was present in groundwater." It can be (and was) estimated, but with the recognition of uncertainty in the model and in the predictions. There are a fair amount of data on the groundwater flow field, which provide the calibration basis for the flow model, and the calibrated flow model has sufficient accuracy and reliability to estimate groundwater velocities and directions. The model basically shows that to simulate the observed increases in concentration at observation points, the timing of the source release becomes more narrowly constrained and its uncertainty is reduced (but not eliminated). The key is that the flow model simulates groundwater flowpaths and velocities with reasonable and acceptable accuracy.

On p. 84, referring to underground storage tanks, Dr. Spiliotopoulos says "The empirical data for UST releases may or may not be applicable to the USTs installed at Camp Lejeune and, therefore, assignment of timing and magnitude for these sources is arbitrary and uncertain." Although uncertainty is clearly recognized, the assignment is not arbitrary. The basis is the EPA data on more than 12,000 leak incidents. Without direct observation to the contrary, why would one think that these USTs would behave much differently than the average failure time for such a large representative sample of documented cases? The approach used is not arbitrary, nor "highly" uncertain, nor an unreasonable assumption.

On p. 85, Dr. Spiliotopoulos goes on to discuss the range of years used in the sensitivity analysis, which spanned ±9 years. The point is not that the starting release date could have been anytime in that 18-year span, but rather to examine how sensitive the results are to such uncertainty. The results shown in Fig. 34 (ATSDR Fig. A37) indicate that at the later times—i.e., during the 18 years of the epidemiological studies—uncertainty in the starting release dates has little effect on estimated TCE concentrations. For the period between about 1950 and 1970, results from each of the various starting dates tend to converge on the same solution after only 3 or 4 years of simulation time.

In the summary for opinion 17 (p. 86), Dr. Spiliotopoulos says "it is not possible to confidently determine the actual period of groundwater contamination …" I would counter that it is possible to do so with some reasonable level of confidence, and ATSDR has done so. Of course there is uncertainty.

Opinion 18: Dr. Spiliotopoulos states that "the sensitivity analysis of the dose reconstruction model for HP was based on parameter variability unsupported by data." And that "the results of the sensitivity analysis were incorrectly presented as an uncertainty analysis range." Support is said to be in Section 4.2.5.1.2.

First, I note that there is some overlap and linkage between sensitivity analysis and uncertainty analysis. Anderson & Woessner (in their 1992 book on "Applied Groundwater Modeling") in discussing sensitivity analysis state: "The purpose of a sensitivity analysis is to quantify the uncertainty in the calibrated model caused by uncertainty in the estimates of aquifer parameters, stresses, and boundary conditions."

On p. 87 (Section 4.2.5.1.2) Dr. Spiliotopoulos argues that the sensitivity analysis used extreme values for parameters. But these "extreme" values were not used for the hindcasting (historical reconstruction), which was done using the calibrated model and calibrated parameter values. The wide range in parameter values was only used to assess model sensitivity and uncertainty, and thereby gain some further understanding of how and why the model is behaving as it does. This is not unusual. It has minimal or negligible effect on the calibrated model.

On p. 89, Dr. Spiliotopoulos argues that the range of parameter values in the sensitivity analysis was too wide. The inference then seems to be that the range of results (shaded areas) shown in Fig. 35 (ATSDR's Fig. A34, shown on p. 90) is too wide and should be narrower (closer to the results for the calibrated model). This doesn't seem like a major problem, as it would imply that the model results may be better defined than indicated otherwise. In looking at sensitivity, ATSDR did not imply that these "extreme" values were realistic or expected. They only illustrated a possible maximum bracketing of results.

In the Summary comments for Opinion 18, Dr. Spiliotopoulos concludes that "ATSDR presented the results of this analysis as indicative of the expected range of reconstructed monthly contaminant concentrations." I don't see where they said or implied this.

Opinion 19: Dr. Spiliotopoulos expresses a concern that the Hadnot Point analysis "only partially addressed model uncertainty." Support is included in Section 4.2.5.2.

In Section 4.2.5.2 (p. 91): In the first paragraph Dr. Spiliotopoulos seems to imply that ATSDR's use of Latin Hypercube Sampling was somehow an oversimplified approach. This is a valid and appropriate method to use in these circumstances. For example, in conducting the Performance Assessment for the radioactive waste repository at the WIPP site in New Mexico, DOE and Sandia National Labs used the LHS approach with their groundwater flow and transport models for the WIPP site, as part of their application for approval to begin operations. This work was carefully reviewed by a National Academy Committee (NRC, 1996) and WIPP was granted approval to begin operations by the U.S. Environmental Protection Agency in the mid-1990s. There is nothing wrong (and a lot right) with the use of this method. EPA approval was granted even though there were no observations at all of concentrations in the aquifer of concern, yet predictions were made for 10,000 years into the future.

Section 4.2.5.2 (p. 91): In indicating that the uncertainty analysis was incomplete, Dr. Spiliotopoulos says (para. 2, p. 91) "ATSDR considered a small number of only 10 uncertainty scenarios." While it is debatable as to whether ten is a "small" number of scenarios to evaluate, it is a reasonable number to consider, and the 10 scenarios encompass a lot of the uncertainty in parameters and boundary conditions. ATSDR accomplished the goal of completing and documenting an uncertainty analysis, although it would have been possible to add additional scenarios to consider. It is highly unlikely, however, that adding more scenarios would lead to a modification of the calibrated model or to a different historical reconstruction.

In the first paragraph on p. 92, Dr. Spiliotopoulos quotes Doherty: "ideally, the value of the prediction should lie somewhere near the center of the uncertainty band." He then states that the ATSDR calibrated model "fails to conform with this rule …" However, this is not anyone's "rule." It is an idealization. Where the calibrated model lies off the center of the uncertainty range of estimates, it may simply be because additional parameters and scenarios need to be incorporated into the Monte Carlo simulations. In statistical testing, it is generally acceptable for a point or sample to fall within a range of two standard deviations of the mean.

In his summary for Opinion 19 (p. 92), Dr. Spiliotopoulos states that "the analysis only partially addressed the model uncertainty." But if more scenarios were considered or if more than 95% of the results were shown, the increased number of scenarios would widen the range and place the calibration results more consistently towards the middle of the range. Most of the time, the calibration is within the range of uncertainty brackets; when not, it is only very slightly above them. Overall, this does not seem to be a major issue. If additional factors were considered, the range would likely be wider and encompass all of the calibrated results. I also see no reason why this would have led to a different set of calibrated parameters.

<u>Section 4.2.5.3, Concluding Remarks (p. 92)</u>: Dr. Spiliotopoulos reiterates his concern that there is lack of historical data to constrain the calibration. He quotes an article that says the "model should replicate observed system behavior." This must be taken in a general way because a model is by definition a simplified approximation of a complex real system, and no model can literally replicate a real system and its behavior. He argues that "The ATSDR model results did not meet this requirement." I disagree, and believe that there was a satisfactory representation of observed behavior for both head distributions and concentration distributions. Could it have been better? Sure, if more data had been available. Is it good enough to produce a reasonable hindcast historical reconstruction? I believe the answer is yes. Dr. Spiliotopoulos says "that there is 'no observed system behavior.'" This is simply wrong. There are some water-level data available, and very good agreement between observed and simulated heads (water levels). This agreement provides confidence in the computed directions and velocities of contaminant migration. There are some observed concentrations. It would be nice if more concentration observations had been made in the past, but they weren't. Where such data are available, the model often provides a very good match to those data. With the goal and implementation of computing monthly averages, there is no way that the model could have replicated the large concentration changes sometimes observed over short time periods and between successive samples. He also states that "ATSDR failed to quantify the uncertainty range reliably." But they did quantify it and document it. They did so reliably. Perhaps it could have been more comprehensive and considered more factors, but that doesn't mean that they didn't "quantify it reliably." Although comprehensive uncertainty analysis is desirable, doing so is not a necessary condition for calibrating a groundwater model.

Section 4.2.5.3, Concluding Remarks (p. 93): Dr. Spiliotopoulos says "If parameter sensitivity and uncertainty can only be evaluated in a qualitative way, …" then the results and conclusions are not "scientifically defensible." The sensitivity and uncertainty analyses were definitely quantitative, and the quote from ATSDR (bottom p. 92) did not say these analyses were ONLY "qualitative". I believe that the model development by ATSDR for both TT and HPHB are scientifically defensible.

Review Comments on Chapter 3:

p. 10, Section 3.1.8 (Concluding Remarks): Dr. Spiliotopoulos says "Model calibration is not possible when there are no historical data to match." However, there are historical data available for Camp Lejeune. The ATSDR models were calibrated using comparisons to historical data—both groundwater level observations and some data on solute concentrations in water samples. There are many direct measurements of hydraulic conductivity—a key parameter in simulating groundwater flow and velocity. So the concluding statement above is simply not applicable to the ATSDR model development and calibration.

p. 12, Section 3.2: In this paragraph, Dr. Spiliotopoulos concludes by stating "However, the timing and quantification of contaminant releases from that source [ABC Cleaners] are uncertain, due to a lack of historical data." Of course, the timing and quantification of contaminant releases from ABC Cleaners has some associated uncertainty. However, there is knowledge of when they operated, precise information on its location, and there is little doubt that it was a source of contamination. The modeling exercises help reduce the uncertainty about the timing and strength of the contaminant source. It is rare (if ever) that the precise release dates and strengths of a historical contamination source are known. This is a type of uncertainty that is commonly dealt with in model development, and this type of uncertainty does not preclude the development, calibration, and usefulness of a groundwater model.

A related issue of contaminant travel times from ABC Cleaners to well TT-26: (**Hennet's report, p. 5-15 – 5-16 and his Attachment D**): Dr. Hennet estimates a range of values for travel times of PCE between ABC Cleaners and TT-26 that are stated to be "in the 15 to 25 years range", based on three assumed "representative" flow paths, indicating the arrival didn't occur until the 1970s. He presents supporting material and calculations in his Attachment D. Dr. Hennet assumes the horizontal travel distance in the shallow aquifer is either (1) 200 ft in the shallow aquifer and 800 ft in the pumped aquifer, (2) 500 ft in the shallow aquifer and 500 ft in the pumped aquifer, or (3) 800 ft in the shallow aquifer and 200 ft in the pumped aquifer. He further assumes that the hydraulic gradient in the layer 2 confining unit is the same in all cases (i.e., at three different distances from the pumping well). This is not a reasonable assumption (for example, see TT Figs. C19 & C21). In the pumped aquifer, a cone of depression will form with lowest heads adjacent to the well and higher heads further from the well. In the shallow aquifer, the heads will not change much due to pumping in the deeper aquifer. This drawdown effect is strongest near the well, and results in a greater hydraulic gradient (and faster velocity) across the confining layer closer to the well.

Pumping also results in a steeper horizontal gradient (and faster velocity) closer to the well in model layer 3, and a shallower gradient further from the well. Dr. Hennet's calculations assume the same horizontal velocity in the pumped aquifer regardless of the distance from the pumped well, which is not a valid assumption.

Examining the heads for model layers 1 and 3 as shown in TT Figs. C18 and C19, and looking at a point about halfway between ABC Cleaners and TT-26 and at a point very close to TT-26, the head difference between the two layers (across the confining bed) is about 10' – 9' = 1 ft at the halfway location and about 5' – 2' = 3 ft at a location close to TT-26. Therefore, the hydraulic gradient potentially driving downward flow is about 3 times greater close to the well than it is halfway between the well and the contaminant source. So this large spatial change in vertical hydraulic gradient must be accounted for, and the assumption that it is the same at all locations cannot be supported. Dr. Hennet does not account for the steeper vertical gradient in layer 2 for the path closer to the pumped well, nor does he account for the faster velocity in layer 3 when the travel distance is only 200 ft.

It is more likely that the travel distance in the shallower aquifer for much of the contaminated shallow groundwater would be more than 800 ft and the corresponding travel distance in the pumped aquifer would be less than 200 ft because (1) the vertically downward transport is more likely to occur where the vertical gradient is the strongest in the confining layer, which is closest to the pumping well, (2) the downward velocity would be fastest where the gradient is steeper close to TT-26, and (3) according to Dr. Hennet's calculations, the downward flux is only about 5% of the horizontal flux in the shallow aquifer, so that even if some contaminant leaked downward at further upgradient distances from TT-26, much would remain in the shallow aquifer to migrate to locations closer to, or even adjacent to, TT-26, where downward leakage would be the fastest. Thus, Dr. Hennet's three "representative" flow paths did not include a more critical flow path in which travel in the shallower aquifer is close to 1,000 ft. For this critical flow path, the travel time would be much less than 15 years—on the order of 3.5 to 5 years. For these several reasons, Dr. Hennet's estimates of travel times from ABC to TT-26 are erroneous, misleading, biased-high, and based on unreliable assumptions.

Well TT-26 pumpage (Hennet's report p. 5-36): Dr. Hennet continues in criticizing the pumpage assumptions about well TT-26. He says, "ATSDR assumed that supply well TT-26 was constantly pumping prior to 1980. This is unlikely as supply wells cannot remain in service for decades without shut down periods for repairs and maintenance." Dr. Hennet implies it is unreasonable to assume this, yet offers absolutely no evidence to support his contention. This can be contrasted with ATSDR's study, which (p. 18) states that they have documented pumping records for TT-26 (and other wells) for some time periods and those estimates "are based on documented information detailing periods of maintenance for specific wells." For earlier periods in which there are no explicit pumping records, TT Chapter C (p. C22-C23) describes their estimation approach in detail (and Dr. Hennet does not offer a better way that this could have been done). Furthermore, in general, well maintenance frequently only requires a day to a few days to complete. If TT-26 had been shut down for only a few days during a few months of every year for servicing, the monthly simulation model would still have to assume it operated for a full month each time, though at a proportionately reduced monthly pumping rate to reflect the actual total monthly withdrawal. It is hard to accept Dr. Hennet's speculative and hypothetical criticism or expect that it would make any difference.

<u>p. 21-22 (Section 3.3) & p. 29:</u> Dr. Spiliotopoulos cites Clement's 2011 issue paper (published in Ground Water journal); but these comments don't cite the Author's Reply (by Clement) to the published Comment by Maslia et al. in response to the original article. In his Reply to the Comment, Clement states "<u>The goal of my article was not to review the Camp Lejeune (CLJ) modeling studies.</u> Rather it was to use the CLJ problem as an example to highlight issues related to model complexities and to spark an open debate on when, where, and why we should limit model complexity." Therefore, Clement admits the article did not constitute a detailed technical review of the Camp Lejeune model study, so his 2011 Issue Paper that appeared to criticize it should not be taken as an expert analysis of the model or of its reliability or of the site. The Comment by Maslia et al. provided detailed rebuttals to Clement's concerns.

<u>p. 21 (Section 3.3):</u> Also, on p. 21 Dr. Spiliotopoulos states that "Dr. Clement's article echoed the NRC's concerns about the uncertainty in ATSDR's water model related to Tarawa Terrace and recommended a simpler approach for the water model related to Hadnot Point and Holcomb Boulevard to meet policy-oriented goals." Dr. Spiliotopoulos implies that the NRC report is a second independent review of the work. With regards to the groundwater modeling, it is not. Dr. Clement, a civil engineer, was the only groundwater expert on that committee (there were no geologists or hydrogeologists on that NRC Committee), so his concerns don't simply echo those of the NRC committee. Instead, it was likely that he was the source of those comments in the NRC Committee. While the use of "simpler models" might be okay for assessing policy-oriented goals, the simpler models would be subject to even greater uncertainty and lack of physical realism. Furthermore, the goals of historical reconstruction require a detailed and fairly complex modeling approach because the system being modeled is complex, and the use of simple models to meet such technical goals would be neither acceptable nor sufficiently accurate.

Regarding the 2009 NRC report and committee, Dr. Spiliotopoulos states that its primary charge was "to assess the strength of evidence in establishing a link or association between exposure to TCE, PCE, and other drinking-water contaminants and each adverse health effect suspected to be associated with such exposure." Consequently, almost all of the NRC Committee members were experts in medical and health fields. Only one was an expert in groundwater. The Committee had neither the focus, goal, intent, nor multiple experts to assess in depth the ATSDR's groundwater models. They were expected to focus on health effects.

Section 3.3 and scientific validity of ATSDR's models: In this section, Dr. Spiliotopoulos refers to statements by Dr. Dan Waddill. Dr. Waddill testified (Aug. 26, 2024, p. 234-235) regarding the ATSDR water modeling that "I do not think their results … were scientifically valid because, you know, science needs to be based on real-world observations and analysis. … and there were just not enough real-world measurements for this to count as a scientifically valid approach." He continues and concludes that the work was not scientifically valid because no concentration data were available in the 1950s-70s, and such observations can no longer be made (obviously). He argues that because of this, the hypothesis cannot be tested, so therefore it is not scientifically valid. I disagree.

I first note that Copi (1961) in discussing science and hypotheses states that "Few propositions in science are *directly* verifiable as true." He later states, "They can, however, be tested *indirectly*." Therefore, I would counter Dr. Waddill's statements by noting that in developing and applying the ATSDR groundwater models, that scientifically valid methods were used, and the models were based on sound hydraulic and physical principles that themselves have been tested and shown to be accurate and reliable approaches to describing and predicting groundwater flow and contaminant transport. The models were also based on many available hydraulic tests measuring hydraulic properties of the subsurface that do not change over time, and hence were data applicable to the site during the 1950s through 1970s. The models are indirectly tested during the calibration process in that available observations are compared to simulated values. This is an indirect type of model testing (or hypothesis testing) in which observations are compared to simulated values. The underlying theories and models have been tested in numerous field studies and are widely recognized as being scientifically valid.

The question should be whether this model for this site was sufficiently well calibrated and representative to perform a hindcasting prediction. I believe it was. I think there are many questions in our universe that are addressed using principles and models of physics that cannot (for all practical purposes) be directly tested in the foreseeable future. That does not render that work to be unscientific or lacking scientific validity. Predictive uses of models, whether forward in time or backwards in time, are widely accepted uses of scientifically valid models, while allowing for the existence and recognition of uncertainty in those predictions. The fact that there is uncertainty does not mean that they are not scientifically valid or scientifically defensible. The fact that one type or time period of observations are not available does not mean that the model is not scientifically valid.

Section 3.3 and Calibration Targets: At several places in this section, the issue of "calibration targets" is mentioned along with criticism that some simulated values did not fall within the calibration target. Relevant to this discussion are my comments in the 2009 Expert Panel Report (p. 101), with which I still agree and which I therefore repeat verbatim here:

> "a. **Are there established standards for establishing specific calibration targets? If so, what are they?** Overall, there are no standards and probably should not be any. Such targets are inevitably arbitrary and to some extent meaningless. They tend to distract from the quality of the calibration process and shift focus to the arbitrary goal. It is a "red herring." Not achieving a predetermined calibration target should not disqualify a model, nor does that prove a model is not valuable or useful. Conversely, meeting such a predetermined calibration target does not prove that the model is a good one or that it meets the needs of the particular study or that its calculations and predictions are accurate and/or reliable.
>
> "b. **Should ATSDR establish different calibration targets than for the Tarawa Terrace model?** In my opinion, the use of specific calibration targets should be abandoned. They have no real value in the context of hydrogeology, and can only serve to provide a false or meaningless image of the quality of the developed model. ATSDR only has a limited time to complete the study, and you will do the best job possible within that limited time and budget. Applying a calibration target will not lead to a better model, but it will cause some time to be spent on comparing the results to the target, and perhaps forcing the results to

fall within the target. It would be better to include on-going independent expert peer review during the model development process, as this will have a much higher payoff than calibration targets in terms of improving the quality of the final product."

Conclusions:

Groundwater models must be (and have been) calibrated in the absence of early time concentration data, as ATSDR has done. Other representative published examples where this has been successfully accomplished include the Rocky Mountain Arsenal, CO (Konikow, 1977) and Lawrence Livermore National Laboratory, CA (Rogers, 1992). In both of these cases, the early time history was reconstructed as part of the model calibration process (it just wasn't called "hindcasting"). This is a widely accepted procedure among groundwater modelers.

Although Dr. Spiliotopoulos repeatedly questions the accuracy of the ATSDR model and its calibration, I don't see any evidence that it is unacceptably inaccurate. In my opinion, ATSDR followed generally accepted methods that yielded reasonably accurate results for the mean monthly concentration of contaminants. ATSDR's TT Table F13 shows comparisons between observed and simulated concentration values, and most (but not all) are within the calibration target range. The presence of differences is not unexpected and does not indicate the model is unreasonably inaccurate or unscientific. Concentrations for many chemical constituents in groundwater typically show a high variation at local spatial scales and small time scales—much greater variability than presented by hydraulic heads. This is normal, and no groundwater transport model would be expected to reproduce or explain such small-scale variability in concentration.

Dr. Hennet presents a summary opinion on p. 5-36 of his report stating "ATSDR's assumptions are deficient, not verifiable, and at times demonstratively incorrect." I believe, to the contrary, that ATSDR's assumptions are reasonable and clearly documented with their supporting basis clearly described in detail and with recognition of uncertainty. I would argue that his counter examples, such as for bulk density and K_d, make little to no difference. Dr. Hennet's own estimates of travel times are clearly deficient and incorrect. Of course, the early time reconstructed concentrations cannot be directly verified. Those data don't exist. That is why the state-of-the-art simulation models were needed. He further states that "ATSDR estimates are not quantitatively reliable as different plausible assumptions would lead to different results." Nonuniqueness of calibrated groundwater models is a well-recognized issue. Different assumptions can lead to different results and different assumptions can also lead to identical results. This is true of every groundwater model ever developed. It does not negate the value or reliability of the model. This is why sensitivity and uncertainty analyses are helpful. Furthermore, it is why we put strong reliance on the expert judgment of those who have studied the particular aquifer system the longest and most in-depth, such as the ATSDR's authors of the modeling reports. Finally, Dr. Hennet says "ATSDR COC concentration estimates are for raw water which is not equivalent to COC concentrations in the distributed water." As I previously stated above, the opinion of experts on the 2005 Expert Review panel was that possible COC losses during water treatment at the Camp Lejeune WTPs would be small to minimal.

In my opinion, ATSDR has done an admirable job in completing a challenging task of using hindcasting with a calibrated model to reconstruct credible concentration distributions in time and space prior to the availability of data from chemical analyses of groundwater samples in the mid-1980s. In the face of missing historical data, the ATSDR models provide useful input to epidemiological studies. ATSDR clearly and comprehensively documented the model development—providing transparency to their work. There is uncertainty in the calibrated models (as there always is in such models) and in the hindcasted results, and that is clearly recognized and evaluated. The uncertainty is not so large or unexpected as to preclude the use of the model results in the epidemiological studies or for providing monthly mean concentrations for use by health professionals to estimate past exposure of residents on an "as likely as not" or "more likely than not" basis. The methods used were rigorous and scientifically sound.

Leonard F. Konikow

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January 13, 2025

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ATTACHMENT A

Leonard F. Konikow, PhD, NAE

Contact Information

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Education

1966 BA, Geology, Hofstra University, Hempstead, New York
1969 MS, Geology, Pennsylvania State University
1973 PhD, Geology, Pennsylvania State University

Work Experience

2020-2023 Editor-in-Chief, *Groundwater* journal
2013-2023 Emeritus Scientist, Water Mission Area, U.S. Geological Survey
1980–2013 Project Chief, Natl. Research Program, Water Resources Division, U.S. Geological Survey, Research Project "Digital modeling of transport in saturated zone"
1978–1980 Staff Hydrologist, Ground Water Branch, U.S. Geological Survey, Reston, Virginia
1974–1978 Project Chief, Research Project "Solute Transport in Ground Water," U.S. Geological Survey, Central Region, Lakewood, Colorado
1972–1974 Project Chief, Subsurface Waste Investigations, U.S. Geological Survey, Lakewood, Colo.
5/66-7/66 Hydrogeologist assistant, Geraghty & Miller, Inc., Groundwater Consultants, Port Washington, NY.

Other Experience*

Instructor and lecturer at:
Fall 1991 & 1992 Department of Environmental Sciences, University of Virginia
Fall 1997 Department of Geological Sciences, Stanford University

Professional Societies*

- American Geophysical Union (AGU) (1970–present; elected Fellow, 2001)
- AGU Spring Meeting Program Chairman for Hydrology (1984–1987)
- AGU Groundwater Committee (1977–1986; Chairman, 1980–1982)
- Geological Society of America (GSA) (1974–present; Fellow since 1990)
- Management Board, Hydrogeology Division, GSA (1991–1995); Chair (1993-1994)
- International Association of Hydrogeologists (IAH) (1985–present); IAH Vice President, North America and IAH Executive Council (2009-2012); Chairman of U.S. National Chapter, IAH (2001–2004)
- National Ground Water Association (NGWA), Scientists and Engineers Division (SAE) (1990–present)
- NGWA/SAE—Board of Directors (1996–2000)
- American Institute of Hydrology (Certified Professional Hydrogeologist) (1991–2023)
- Registered Professional Geologist, Pennsylvania (1996–2023)

Honors and Awards*

- Birdsall Distinguished Lecturer (1985–1986), GSA, Hydrogeology Division
- M. King Hubbert Science Award (1989), Life Member Award (2013) National Ground Water Association
- O.E. Meinzer Award (1997), Distinguished Service Award (2000), GSA, Hydrogeology Division
- C.V. Theis Award (1998), American Institute of Hydrology
- Distinguished Service Award (1999), U.S. Department of Interior
- Elected as Fellow (2001), American Geophysical Union
- President's Award (2001), International Association of Hydrogeologists
- **Elected to National Academy of Engineering (2015)**

*** Partial list; more details available upon request.**

Selected Professional Activities*

- Rocky Mountain Arsenal (Colorado) Technical Review Committee (1975–1977)
- National Research Council, Panel on Groundwater Contamination (1981–1982)
- National Research Council, Committee on Ground-Water Modeling Assessment (1987–1989)
- National Research Council, Waste Isolation Pilot Plant Committee (1989–1997)
- Peer Review Panel, U.S. EPA Environmental Monitoring Systems Lab, Las Vegas, Nevada (1991)
- National Science Foundation, Review Panel for Hydrologic Sciences and interim staff assistant (1992)
- Member of Modeling Project Subcommittee, Science Advisory Board, U.S. EPA (1993)
- Associate Editor, Ground Water Journal (1993–1995); Water Resources Research (1981-1984)
- Adviser to U.S. AID project studying seawater intrusion in Gaza and Morocco (1994–1997)
- National Research Council, Committee on Principles and Operational Strategies for Staged Repository Systems (2001–2002)
- Expert Peer Review Panel for ATSDR to evaluate historical ground-water contamination and water-supply distribution problems at Tarawa Terrace, U.S. Marine Corps Base, Camp Lejeune, NC (March 2005)
- Expert Peer Review Panel for the South Florida Water Management District (SFWMD) to evaluate East Central Florida Transient model (Oct. 2006-Feb. 2007)
- Coastal Sound Science Initiative Technical Advisory Committee for Georgia and S.C. (2008)
- Expert Peer Review Panel for ATSDR to evaluate historical ground-water contamination at Hadnot Point area of the U.S. Marine Corps Base, Camp Lejeune, NC (April, 2009)
- International Scientific Advisory Committee for the National Centre for Groundwater Research & Training of Australia (2009-2014)
- Member of an Independent Review Panel to evaluate the Death Valley Regional Flow System Project for the USGS Nevada Water Science Center (March-July 2014)
- AGI, Geoscience Policy Advisory Comm. (2005-16); Critical Needs Working Group (2015-16)
- Invited lecturer, McCormick Specialized Reporting Institute 2015: Covering Water in a Changing World, University of Florida, College of Journalism & Communications, Gainesville, FL (Nov. 2015)
- Chair, DOE Expert Peer Review Panel for the Rainier Mesa/Shoshone Mountain Flow and Transport Model, Nevada National Security Site (NNSS), Nevada (Oct. 2017-April 2018)
- Member, DOE Expert Peer Review Panel for the Pahute Mesa Flow and Transport Model, NNSS (2022)

Publications*

Author or coauthor of numerous articles in peer-reviewed journals, government publications, conference proceedings, book chapters, and talks given at professional society meetings (complete detailed list available on request).

Konikow, L.F., and Bredehoeft, J.D., 1974, Modeling flow and chemical-quality changes in an irrigated stream-aquifer system: Water Resources Research, v. 10, no. 3, p. 546-562.

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Konikow, L.F., 2011, The Secret to Successful Solute-Transport Modeling: Ground Water, v. 49, no. 2, p. 144-159. doi: 10.1111/j.1745-6584.2010.00764.x.

Bredehoeft, J.D., and Konikow, L.F., 2012, Reflections on Our Model Validation Editorial: Ground Water, v. 50, no. 4, p. 495.

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Konikow, L.F., 2015, Long-term groundwater depletion in the United States: Groundwater, v. 53, no. 1, p. 2-9.

Konikow, L.F. and J.D. Bredehoeft, 2020. Groundwater Resource Development: Effects and Sustainability. The Groundwater Project, Guelph, Ontario, Canada. https://gw-project.org/books/groundwater-resource-development/

* **Partial list; more details available upon request.**

ATTACHMENT B

Jan. 13, 2025

Leonard F. Konikow

Publications During Past 10 Years

Konikow, L.F., 2015, Long-term groundwater depletion in the United States: Groundwater, v. 53, no. 1, p. 2-9, doi: 10.1111/gwat.12306.

Alley, W.M., and Konikow, L.F., 2015, Bringing GRACE Down to Earth: Groundwater, v. 53, no. 6, p. 826-829, doi: 10.1111/gwat.12379.

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Konikow, L.F., 2020, Passing the Torch. [Editorial] Groundwater, v. 58, no. 1, p. 1-2. doi: 10.1111/gwat.12964.

Marshall, S.K., Cook, P.G., Konikow, L.F., Simmons, C.T., and Dogramaci, S., 2020, Conjoint use of hydraulic head and groundwater age data to detect hydrogeologic barriers. *Hydrogeology Journal,* v. 28, 1003–1019. https://doi.org/10.1007/s10040-019-02095-9

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EXHIBIT 6

Rebuttal Response to:

Reports of Alexandros Spiliotopoulos, Remy J.-C. Hennet & Jay Brigham

Prepared by:

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List of Figures

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Glossary of Abbreviations and Acronyms

Definitions of terms and abbreviations used throughout this report are listed below.

A

AS Alexander Spiliotopoulos, Ph.D., DOJ Expert

ATSDR Agency for Toxic Substances and Disease Registry; codified under CERCLA, section 104(i), 42 U.S.C. §9604(i); https://atsdr.cdc.gov

B

BTEX Benzene, toluene, ethylbenzene, and xylenes

Bz Benzene

C

CERCLA The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also known as Superfund

CLW Camp Lejeune Water document

COC Contaminant or chemical of concern

D

DCE 1,1-dichloroethylene or 1,1-dichloroethene

1,2-tDCE *trans*-1,2-dichloroethylene or *trans*-1,2-dichloroethene

DON Department of the Navy

E

EDRP Exposure-Dose Reconstruction Program developed by ATSDR in 1993

EPA U.S. Environmental Protection Agency, https://www.epa.gov, also see USEPA

F

ft Foot or feet

ft^3/d Cubic foot per day

G

Ga. Tech Georgia Institute of Technology, Atlanta, Georgia

g Grams

gpm Gallons per minute

H

HB Holcomb Boulevard

HBWTP Holcomb Boulevard water treatment plant

HP Hadnot Point

HPFF Hadnot Point fuel farm

HPIA Hadnot Point Industrial Area

HPLF Hadnot Point landfill

HPWTP Hadnot Point water treatment plant

I

J

JB Jay L. Bringham, Ph.D., DOJ Expert

L

LCM Linear control model; a model based on linear control theory methodology developed to reconstruct historical contaminant concentrations in water-supply wells

LHS Latin hypercube sampling

M

MODFLOW A family of three-dimensional groundwater-flow models, developed by the U.S. Geological Survey, https://www.usgs.gov/mission-areas/water-resources/science/modflow-and-related-programs

MT3DMS Three-dimensional mass transport, multispecies model developed on behalf of the U.S. Army Engineer Research and Development Center. MT3DMS-5.3 (Zheng and Wang 1999) is the specific version of MT3DMS code used for the Hadnot Point–Holcomb Boulevard study area analyses

MCL Maximum contaminant level

µg/L micrograms per liter; 1 part per billion

Model calibration The process of adjusting model input parameter values until reasonable agreement is achieved between model-predicted outputs or behavior and field observations

N

ND non-detect

NRC National Research Council

P

PCE Tetrachloroethene, tetrachloroethylene, 1,1,2,2-tetrachloroethylene, or perchloroethylene; also known as PERC® or PERK®

PDF Probability density function

R

RH Remmy J.-C. Hennet, Ph.D., DOJ Expert

ROD Record of Decision

S

SCADA Supervisory control and data acquisition

T

TCE 1,1,2-trichloroethene, or 1,1,2-trichloroethylene, or trichloroethylene

TechFlowMP A three-dimensional multispecies, multiphase mass transport model developed by the Multimedia Environmental Simulations Laboratory at the Georgia Institute of Technology, Atlanta, Georgia

TT Tarawa Terrace

TTWTP Tarawa Terrace water treatment plant

U

USMC U.S. Marine Corps

USMCB U.S. Marine Corp Base

UST Underground storage tank

V

VC Vinyl chloride

VOC Volatile organic compound

W

WDS Water-distribution system

WTP Water treatment plant

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1.0 Introduction

I am Morris L. Maslia, P.E., a licensed Professional Engineer in the State of Georgia and a consulting engineer retained by the Camp Lejeune Plaintiffs' attorneys. On December 10, 2024, I was provided with electronic copies of the Expert Reports of Alexandros Spiliotopoulos (**AS**), Remy J.-C. Hennet (**RH**), and Jay L. Brigham (**JB**), who have been retained by the U. S. Department of Justice (DOJ). Their Expert Reports evaluate and review the Agency for Toxic Substances and Disease Registry's (ATSDR) water-modeling analyses and historical reconstruction conducted at U.S. Marine Corps Base (USMCB) Camp Lejeune, North Carolina, for the Tarawa Terrace (TT), Hadnot Point (HP), and Holcomb Boulevard (HB) water treatment plants (WTP), water-distribution systems (WDS), and associated service areas.

Purpose of Report

The purpose of this rebuttal report is to respond to certain positions as set out by the DOJ Expert Reports (authored by AS, RH, and JB), dated December 9, 2024 (Spiliotopoulos 2024, Hennet 2024, Brigham 2024). My responses are grouped by major topical areas discussed and presented in the DOJ Expert Reports and listed below (Section 4.0 of this report). This report is organized as follows:

- **Section 1.0:** Introduction
- **Section 2.0:** Purpose of Rebuttal Report
- **Section 3.0:** Agreed Upon Concepts and Facts
- **Section 4.0:** Response to Department of Justice (DOJ) Expert Reports
    - **Section 4.1:** Start Dates for Sources of Contamination
    - **Section 4.2:** Water-Supply Well Operations
    - **Section 4.3:** Volatilization of VOCs During Water Treatment Process
    - **Section 4.4:** Derivation and Computation of Sorption Parameter Values
    - **Section 4.5:** Model Calibration and Uncertainty Analysis
    - **Section 4.6:** Post-Audit of the ATSDR Tarawa Terrace Models
    - **Section 4.7:** Graphing and Visualization of Data and Model Results
    - **Section 4.8:** Non-Degraded and Degraded PCE Historical Reconstructions
    - **Section 4.9:** Additional Topics
- **Section 5.0:** Summary and Conclusions
- **Section 6.0:** References
- **Appendices A:** Volatilization Issues: Excerpts from ATSDR's Expert Panel Meetings, March 28, 2005 and April 30, 2009

3.0 Agreed Upon Concepts and Facts

Prior to providing responses to DOJ Expert Reports (Spiliotopoulos 2024, Hennet 2024, Brigham 2024), I set forth several fundamental concepts that are accepted as scientifically valid approaches and facts that can be agreed upon. These are listed below.

1. The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal, non-regulatory public health agency codified in the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) of 1980, also known as Superfund (CERCLA 1980); 42 U.S.C. §9604(i).

2. ATSDR, overseen by the U.S. Department of Health and Human Services, is the lead federal public health agency for determining, preventing, and mitigating the human health effects of exposure to hazardous substances. It does this by responding to environmental health emergencies, investigating emerging environmental health threats, conducting research on health impacts of hazardous waste sites (public health assessments, epidemiological studies, and toxicological profiles), and building capabilities and providing actionable guidance to state and local health partners.

3. When data are limited or unavailable, ATSDR conducts exposure-dose reconstruction studies, which can include the use of environmental data, models (air, soil, water, and pharmacokinetic) or biomarkers to estimate and quantify environmental concentrations and exposures to toxic substances.

4. Historical reconstruction is an analysis and diagnostic method used to examine historical characteristics of groundwater flow, contaminant fate and transport, water-distribution systems, air dispersion, and exposure to contaminants (chemical and radiological) when data are limited or unavailable. It is an accepted method of analysis having been applied since the 1930s and described in many peer-reviewed publications (*e.g.*, Costas et al. 2002, Grayman et al. 2004, Konikow and Thompson 1984), Maslia ad Aral 2004, NRC 199), Rodenbeck and Masli,1998, Rogers 1996, Samhel et al. 2010).

5. The mathematical, analytical, and numerical models (e.g., groundwater flow, contaminant fate and transport, and water-distribution system) used by ATSDR are accepted tools and practices among engineers, researchers, and scientists. These models approximate the physics of groundwater flow and contaminant fate and transport, which do not depend on professional judgment. The uncertainty in these models can be reasonably bounded and quantified to provide useful results of chemical exposure (EPA 1998).

6. The rationale and justification for using the historical reconstruction process, including models, at Camp Lejeune is precisely because historical data were limited and not available to ATSDR. As such, the models play an important role in providing insight, information, and quantitative estimates of environmental and exposure concentrations when data are missing, insufficient, or unavailable (Konikow and Thompson 1984, Maslia and Aral 2004).

4.0 Response to Department of Justice (DOJ) Expert Reports

In this section, I present rebuttal responses to DOJ Expert Reports by topical subject matter. The opinions in this report are based on my review of the DOJ Expert Reports, published literature, data and documents made available to me while consulting on this case (e.g., Plaintiffs' and DOJ's Expert Reports) and my work and analysis during my work on the Camp Lejeune studies as an employee of ATSDR. I have reviewed and am relying upon the rebuttal expert reports of Dr. Leonard F. Konikow, Dr. Norman Jones/Mr. R. Jeffrey Davis, and Dr. David R. Sabatini. I hold the opinions expressed in this report to a reasonable degree of scientific and engineering certainty. I will produce a list of all materials I considered in reaching these opinions within seven days of service of this report. Many of the materials, documents, and data are also listed in the publicly available ATSDR reports on Tarawa Terrace (Maslia et al. 2007) and Hadnot Point-Holcomb Boulevard (Maslia et al. 2013, Appendix A2).

4.1 Start Dates for Sources of Contamination

4.1.1 ABC One-Hour Cleaners

The ATSDR Tarawa Terrace (TT) fate and transport modeling analysis applied a 1,200 gram/day (g/d) tetrachloroethylene (PCE) mass loading rate as the contaminant source at ABC One-Hour Cleaners. ATSDR used a contaminant (source) release date of January 1953. DOJ Experts (AS, RH, and JB) posit that July 1954 is a more appropriate start date for releases of PCE at ABC One-Hour Cleaners (Spiliotopoulos 2024, Section 4.1.2.1; Hennet 2024, Opinion 3; Brigham 2024, Section IV.B). ATSDR relied upon the deposition (sworn testimony) of Victor Melts (owner of ABC One-Hour Cleaners) who testified on April 12, 2001 that he started ABC One-Hour Cleaners in 1953 and that he operated the company in the same location since 1953 (Melts 2001, p.6–7)[1]. Additionally, in remedial investigation reports of the ABC One-Hour Cleaners site by Roy F. Weston, Inc. (1992, 1994)[2] a specific date for start of operations is not provided; rather, these documents indicate that ABC One-Hour Cleaners is a North Carolina corporation registered with the Secretary of State as of March 4, 1958. The U.S. Environmental Protection Agency's (EPA) Record of Decision (ROD) for the ABC One-Hour Cleaners Site (Section 2.1 Facility Operations and History)[3] also does not provide a specific date for start of operations—it also indicates that ABC One-Hour Cleaners is a North Carolina corporation registered with the Secretary of State as of March 4, 1958. Without documented information and data as to the specific date for start of operations at ABC One-Hour Cleaners, ATSDR relied upon the sworn testimony of Victor Melts (Melts 2001, p. 6-7).

To test the effect of varying the start date for operations at ABC One-Hour Cleaners on reconstructed PCE concentrations, Plaintiffs' experts conducted a sensitivity analysis using the calibrated (and published) ATSDR Tarawa Terrace MODFLOW and MT3DMS input files (Maslia et al., 2007, provided on DVD). The sensitivity analysis consists of applying the following start date of operations (source release dates) at ABC One-Hour Cleaners:

- January 1953 (ATSDR calibrated model start date used in Faye 2008)
- January 1954 (+1 year from calibrated model start date)
- July 1954 (+1.5 years from calibrated model start date posited by DOJ Experts AS, RH, and JB)

[1] CLJA document 00897_PLG_0000067569 – 00897_PLG_0000067570.
[2] CLJA_WATERMODELING_09-0000083841; CLJA_WATERMODELING_09-0000084255.
[3] CLJA_EPA01-0000383135 – CLJA_EPA01-0000383136.

- January 1955 (+2 years from the calibrated model start date)

Results of varying the start dates of operations at ABC One-Hour Cleaners (source release date) are shown in Figures 4.1A and 4.1B for reconstructed PCE concentrations at water-supply well TT-26 and the Tarawa Terrace water treatment plant (TTWTP), respectively. These results show that the calibrated TT modeled PCE concentrations are insensitive to these variations in source release date throughout much of the exposure period since these variations make a negligible difference in PCE concentrations from the calibrated reconstructed concentrations for the duration of the epidemiological study (1968-1985)[4], as listed in Table 4.1. Additionally, the dates that the maximum contaminant level (MCL) for PCE of 5 ug/L is exceeded at water-supply well TT-26 and at the TTWTP, the duration of exceedance (in months), and the maximum reconstructed concentrations are listed in Table 4.2. Note the negligible changes from the calibrated ATSDR model results due to the variable start dates (Maslia et al. 2007; Faye 2008). Based on this sensitivity analysis, I conclude that the ATSDR calibrated models for reconstructing PCE concentrations are not sensitive to the start date of operations (source release date) at ABC One-Hour Cleaners. I stand by the ATSDR start of operations at ABC One-Hour Cleaners of January 1953, as documented in the sworn testimony of Victor Melts (2001) and applied by Faye (2008) as a more reliable start date.[5]

[4] Reconstructed concentrations are shown for the start of the epidemiological study of January 1968 and the last in-service date of TT-26.

[5] The evidence for ABC One-Hour Cleaners opening in 1954 as presented by Dr. Jay Brigham is circumstantial. Advertisements are subject to a lag in publication so that they may come out well after things have changed on the ground. Similarly, grand openings often occur well after a business has opened, when operations are more fully established. The sworn testimony of Mr. Melts is more reliable than the information provided by Dr. Brigham.

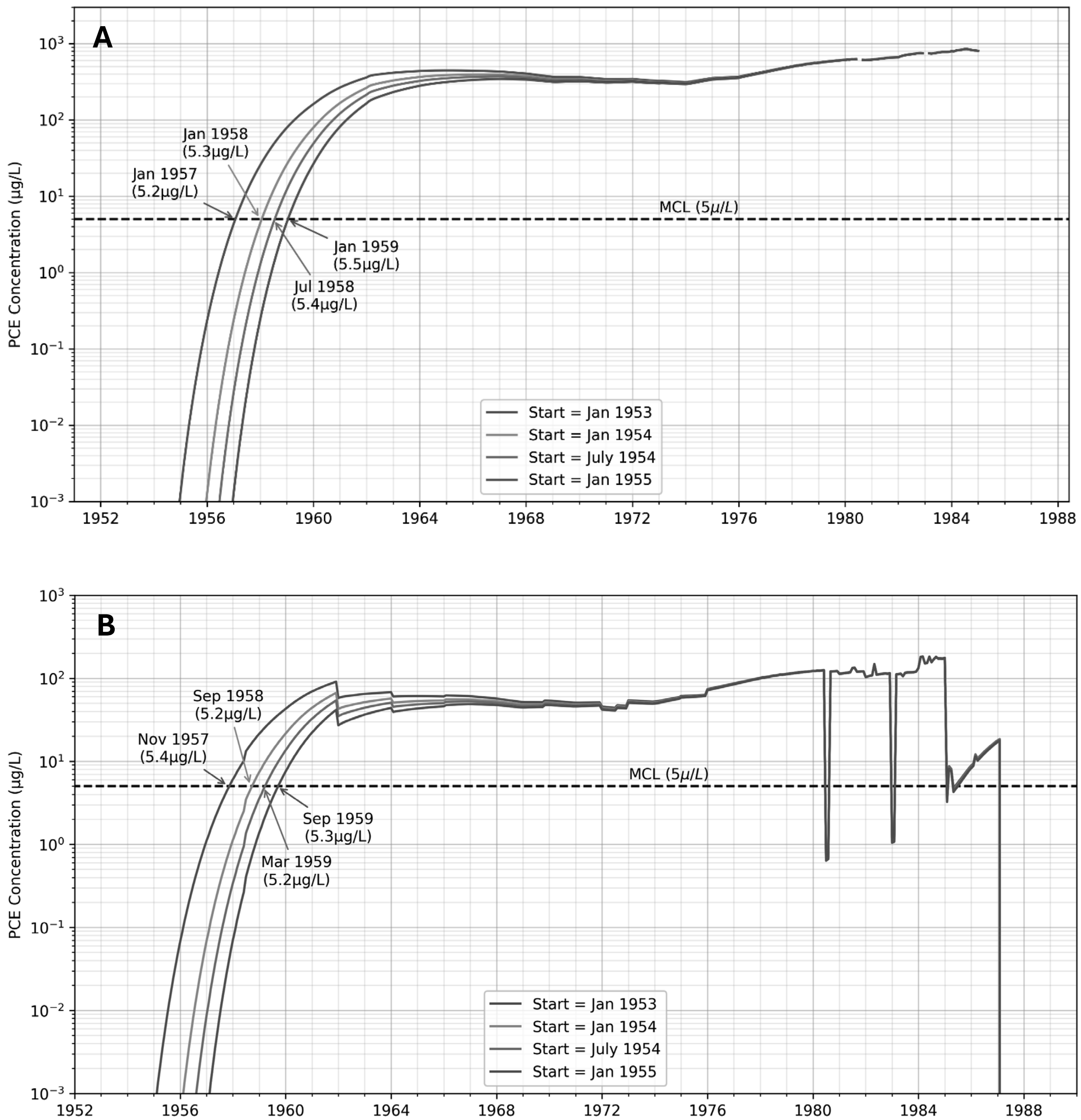

Figure 4.1. Plot of Modeled Concentration of tetrachloroethylene (PCE) with source release date variation: A, water-supply well TT-26 and B, Tarawa Terrace water treatment plant (TTWTP)

Table 4.1. Reconstructed PCE concentrations for variations in source release date at water-supply well TT-26 and the Tarawa Terrace water treatment plant (TTWTP)+

[µg/L, micrograms per liter, PCE, tetrachloroethylene]

Date*	January 1953+	January 1954	July 1954	January 1955
Water-supply well TT-26				
January 1968	402	373	356	336
January 1985	804	802	801	800
Tarawa Terrace water treatment plant (TTWTP)				
January 1968	57	53	51	48
January 1985	176	176	175	175

+Using calibrated ATSDR model parameter values and published model input files (Maslia et al. 2007)

*January 1968 is start of ATSDR's epidemiological study; January 1985 is last operating month for well TT-26

Table 4.2. Date reconstructed PCE concentration exceeds the MCL (5 µg/L), duration of exceedance, and date of maximum concentration for variations in source release date, at water-supply well TT-26 and at Tarawa Terrace water treatment plant (TTWTP)+

[MCL, maximum contaminant level; µg/L, micrograms per liter; PCE, tetrachloroethylene]

Source release date	Date exceeding MCL (5 µg/L)	Duration exceeding MCL, in months	Maximum PCE, in µg/L (date of occurrence)
Water-supply well TT-26			
Jan 1953+	Jan 1957	361	851 (Jul 1984)
Jan 1954	Jan 1958	349	849 (Jul 1984)
Jul 1954	Jul 1958	343	849 (Jul 1984)
Jan1955	Jan 1959	337	847 (Jul 1984)
Tarawa Terrace water treatment plant (TTWTP)			
Jan 1953+	Nov 1957	351	183 (Feb 1984)
Jan 1954	Sept 1958	341	183 (Feb 1984)
Jul 1954	Mar 1959	335	182 (Feb 1984)
Jan1955	Sept 1959	329	182 (Feb 1984)

+Using calibrated ATSDR model parameter values and published model input files (Maslia et al. 2007)

4.1.2 Hadnot Point Industrial Area and Landfill

In Section 4.2.3.2 (Spiliotopoulos, 2024, pp. 78-79), AS notes that ATSDR recognizes the lack of explicit data defining source locations and mass loadings but criticizes ATSDR for "arbitrarily assigning these quantities to the model to fit the limited water-quality data available starting in 1982." However, AS's critique goes to the heart of the model calibration, history matching, and parameter estimation processes used in groundwater modeling. In these processes, parameter values are adjusted (either manually or automatically) to improve the fit (Hill and Tiedeman, 2007).

Furthermore, ATSDR conducted meticulous and detailed source characterization analyses, as documented in Maslia et al. (2013, Tables A6, A7, and A8). Table A8, shown below as Table 4.3 of this report, provides specific information relevant to documented source areas, timelines, primary contaminants, and locations of major dissolved sources for the HPIA and HPLF areas.

Table 4.3. Maslia et al. (2013), Table 8.

Table A8. Identification of documented source areas, timelines, primary contaminants, and location of major dissolved-phase sources, Hadnot Point–Holcomb Boulevard study area, U.S. Marine Corps Base Camp Lejeune, North Carolina.

[HPFF, Hadnot Point fuel farm; UST, underground storage tank; AS/SVE; air sparging/soil vapor extraction; MW, monitor well; µg/L, microgram per liter; gal, gallon; LUST, leaking underground storage tank; CERCLA, Comprehensive Environmental Response, Compensation, and Liability Act of 1980; TCE, trichloroethylene; PCE, tetrachloroethylene]

[1] Source-area timeline [reference documents]	Primary contaminant; number of major sources	Location of major dissolved-phase sources
Hadnot Point Industrial Area (see Figure A13)		
Hadnot Point fuel farm events **1941**, HPFF USTs installed [UST #669, UST #670] **1942**, Building 1115 USTs installed [UST #670] **1993 January**, HPFF and Building 1115 USTs removed [UST #1186, UST #670] **2000 December**, Piping removal (extensive) at HPFF/Building 1115 [UST #417] **Building 1613 events** **1950s**, USTs installed [UST #548, UST #546] **1995 January**, USTs and contaminated soil removed [UST #535, UST #548] **1998–2004**, AS/SVE remediation system operated **Building 1601 events** **1940s**, Building 1601 built [UST #172, UST #195] UST removal date unknown	Benzene; three sources	HPFF/Building 1115/Building 1101 free product footprint Building 1613 free product footprint Building 1601 locations of maximum measured benzene in groundwater (78-GW75-1 and 78-GW74) and former location of USTs and dispenser island at southeast corner of building; MW 78-GW75-1 (5,500 µg/L in 2003; 3,200 µg/L in 2004); MW 78-GW74 (3,200 µg/L in 2004) (See Figure A9 for building and monitor well [MW] locations)
Building 1601 events **1940s**, Building 1601 built [UST #172, UST #195] **1942**, 1,500-gal UST install date listed in LUST study completed in 1990 by Geraghty and Miller [UST #504, UST #507] **1993 June 29**, UST excavated/removed [UST #624] **Building 901/902/903 events** **1948**, Buildings 900, 901, 902, 903 constructed [CERCLA #258, p. 149] TCE UST installation date unknown; removal/abandonment date unknown, but probably occurred prior to onset of remediation efforts around January 1995 [Sovereign Consulting, Inc. 2007]	TCE; two sources	Building 1601 locations of maximum measured TCE in groundwater (MW 78-GW09-1 (old) and (new)) and former location of 1,500-gal waste UST on north side of building; MW 78-GW09-1 (old) (5,000–14,000 µg/L during 1987–1991); MW 78-GW09-1 (new) (at/above 1,000 µg/L during 1993–1996) Building 901/902/903 locations of max measured TCE in groundwater (MW 78-GW23; 13,000 µg/L in 1987), maximum measured vinyl chloride in groundwater (MW 78-GW44; 1,600–6,700 µg/L during 2000–2004), and former locations of USTs containing TCE/solvent waste at Building 901 and between Buildings 902/903. (See Figure A9 for building and monitor well [MW] locations)
Hadnot Point landfill area (see Figure A14)		
Landfill **1940s**, reportedly used as a waste disposal area (Site 6 and Site 82; Figure A8) beginning in the 1940s	PCE and TCE; one source	Location of maximum measured concentration of TCE and PCE in groundwater (MW 06-GW01D) TCE ranged from 6,400 to 180,000 µg/L during 1992–2004; PCE ranged from 210 to 6,500 µg/L during 1992–2004 (See Figure A10 for monitor well [MW] locations)

[1] UST # refers to UST Web Management Portal file number (see References section of this report for complete details); CERCLA # refers to CERCLA Administrative Record file number (provided on digital video disc [DVD] in Maslia et al. 2007)

ATSDR does indeed discuss the lack of data to define the source loading terms for the model in the Hadnot Point Industrial Area (HPIA) and Hadnot Point landfill (HPLF) areas. However, as Dr. Konikow (2025) notes and I agree, there is no doubt that these chemical contaminants (including TCE and PCE) were present in the groundwater at toxic concentrations (substantially exceeding the MCLs[6]) in these areas, and that they were pumped out of the aquifer by several operating water-supply wells shown in Maslia et al. (2013, Figures A9 and A10) and provided below as Figures 4.2 and 4.3.

In AS's summary for his Opinion 14 (Spiliotopoulos, 2024, p. 79), ATSDR is criticized for having "assumed constant mass loading of the same magnitude at all sources for more than 40 years," which he believes is "highly uncertain, if not impossible." I disagree. ATSDR applied an average rate over the critical period because there was no basis for determining how the loading might have varied over time. This approach aligns with accepted groundwater flow and contaminant fate and transport modeling best practices. The fact that the model with a constant mass loading adequately reproduced observed concentrations supports ATSDR's method for modeling the sources at Hadnot Point Industrial Area and Hadnot Point landfill. (Konikow 2025)

Finally, ATSDR reviewed an EPA study (USEPA 1986, 1986) of 12,444 leak incident reports to estimate the timing of UST releases at Hadnot Point. This is certainly not "arbitrary and uncertain." Reliance upon such a comprehensive study is an accepted methodology; it is not "arbitrary." In summary, ATSDR based parameter values on the best data it had available, including site-specific and published data. ATSDR also made appropriate adjustments to parameters to fit site-specific conditions.

[6] MCL, maximum contaminant level; 5 μg/L for PCE and 5 μg/L for TCE.

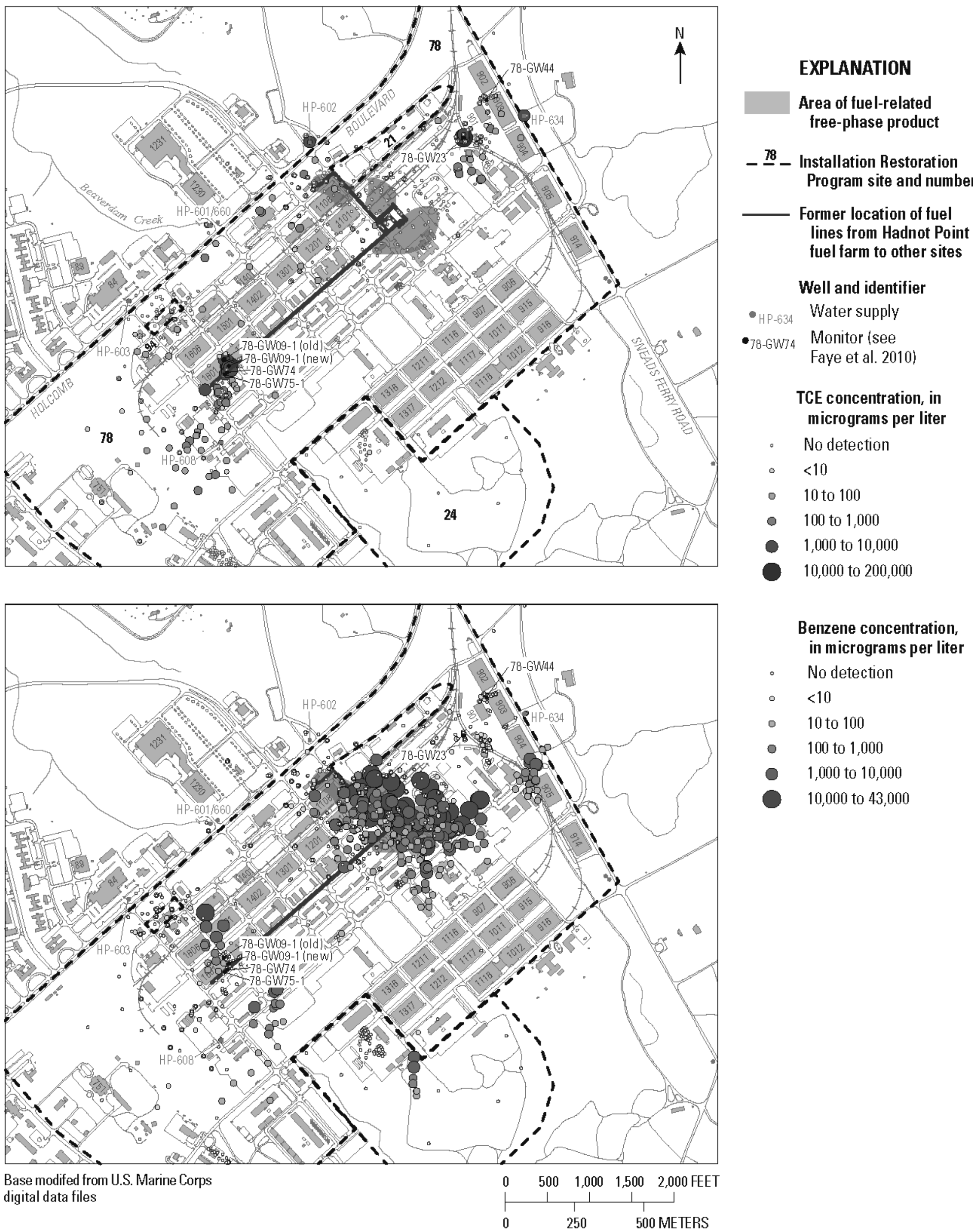

Figure A9. Sampling data for trichloroethylene (TCE), benzene, and fuel-related free product in groundwater for the Hadnot Point Industrial Area, Hadnot Point–Holcomb Boulevard study area, U.S. Marine Corps Base Camp Lejeune, North Carolina. (See Figure A8 for location and Figure A13 for selected building numbers.)

Figure 4.2. From Maslia et al. (2013), Figure A9

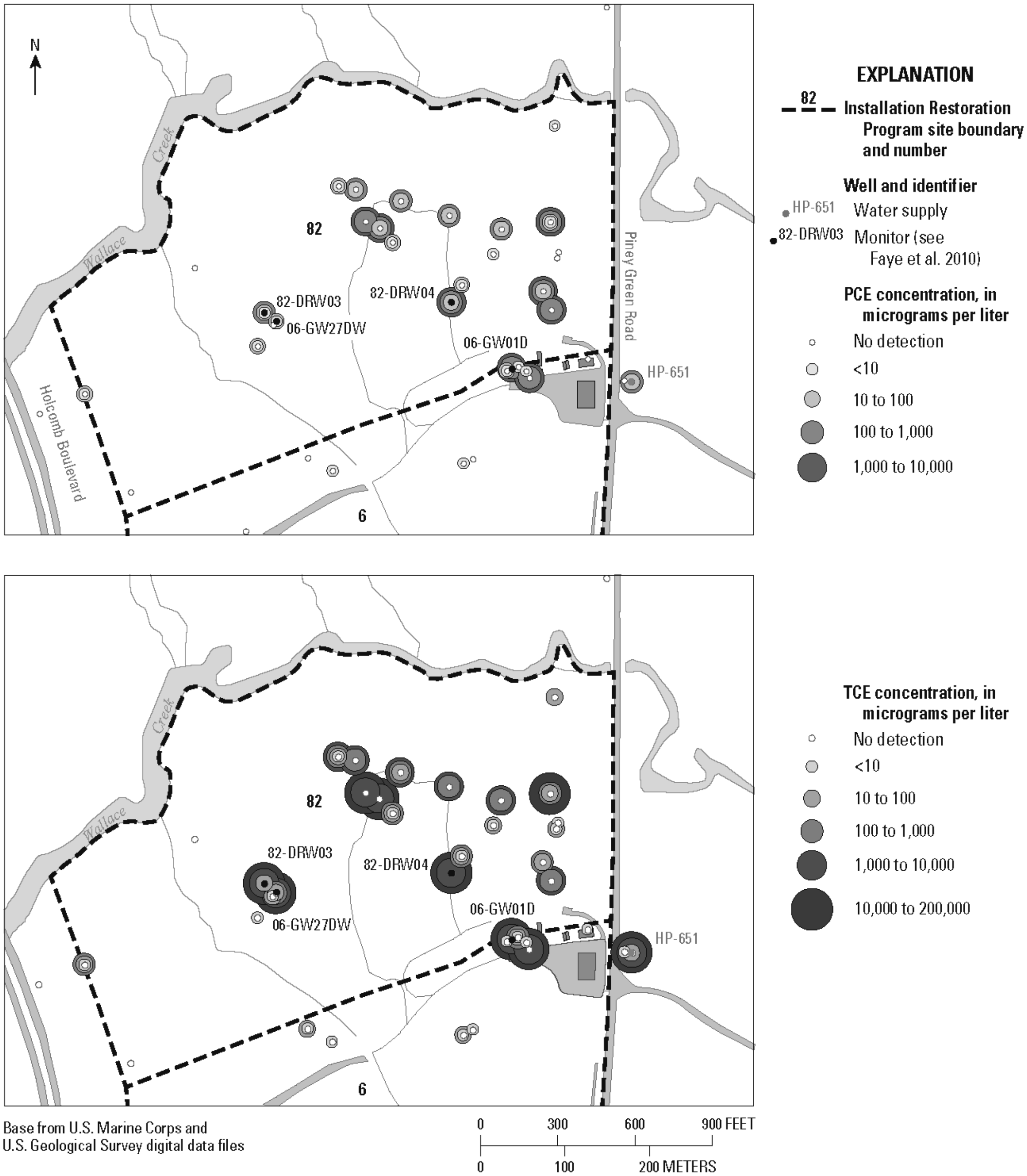

Figure A10. Sampling data for tetrachloroethylene (PCE) and trichloroethylene (TCE) in groundwater for the Hadnot Point landfill area, Hadnot Point–Holcomb Boulevard study area, U.S. Marine Corps Base Camp Lejeune, North Carolina. (See Figure A8 for location.)

Figure 4.3. From Maslia et al. (2013), Figure A10

4.2 Water-Supply Well Operations

4.2.1 Tarawa Terrace

In his opinion 5, Spiliotopoulos (2024, Section 4.1.2.6) posits that the ATSDR groundwater model for TT resulted in "biased-high estimates of monthly contaminant concentrations" at water supply well TT-23. (his Section 4.1.2.6). I concur with Dr. Konikow's assessment of opinion 5:

> Section 4.1.2.6 (p. 42) offers no clear evidence that the discrepancy at this one well (out of many) has a substantial impact on the overall results. Based on ATSDR Table E2, of the nine unique sampling dates for this well, six had an observed level of PCE or TCE above the MCL. Furthermore, with respect to the overall effect on concentrations estimated at the WTPs, it is important to note that TT-23 was operational for only about 9 months or less, starting in 1984, and had the shortest operational (pumping) period of any of the 16 pumping wells operating in the TT area (see Table H3 in Chapter H of the TT series of reports). When it was pumping, the contribution from this well provided only a small fraction of the total groundwater inflow to the WTP with concentrations far less than well TT-26 (with its modeled concentrations likely being underestimated). Thus, if indeed the estimates for this well were too high (by less than two times), the effect on calculated concentrations in the WTP would be minimal both in magnitude and in duration.
>
> (Konikow 2025).

With respect to calibrated ATSDR models being "biased high" as posited by DOJ experts, the opposite is true. For example, Figure 4.4 from Faye (2008, Figure F16)[7] shows a plot of observed data (5 of the 6 samples were obtained within a week's time) and reconstructed PCE concentrations for water-supply well TT-26. Note that the highest and first sample was taken during the period when this well was in service, as compared to the remaining samples when this well was out of service. If anything, it could be argued that the model is under-predicting the concentrations. Furthermore, note that reconstructed PCE concentrations fell almost exactly at the midpoint of the range of observed values (about 800 ug/L)—countering the claim of being biased high and confirming the adequateness and acceptability of the calibrated ATSDR models including the reconstructed supply-well operations. As with well TT-23 discussed above, the first sample from well TT-26 was taken when it was operating, and the remainder of the samples were taken after well TT-26 was permanently removed from service.

[7] CLJA_WATERMODELING_01-0000488379.

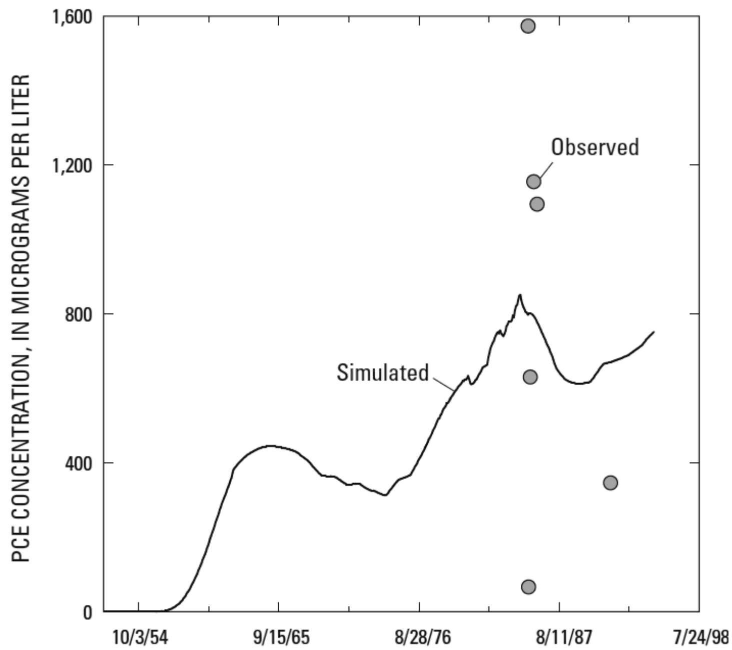

Figure F16. Simulated and observed tetrachloroethylene (PCE) concentrations at water-supply well TT-26, Tarawa Terrace, U.S. Marine Corps Base Camp Lejeune, North Carolina, January 1952–December 1994 (see Figure F6 for location).

Figure 4.4. From Faye (2008), Figure F16.

4.2.2 Hadnot Point

In Section 4.2.2 (Spiliotopoulos, 2024, p. 72), the claim is made that ATSDR "made arbitrary assumptions to reconstruct pumping history…" I agree with Dr. Konikow who, after reviewing the ATSDR's historical reconstruction, concluded:

> In my opinion, the assumptions were not arbitrary, but rather were well-informed, well-reasoned, and carefully documented. Assumptions had to be made about the pumping history, and they were made, but they were not arbitrary. For example, Dr. Spiliotopoulos notes that "Yearly volumes are available for some years prior to 1980. A trendline was used to estimate raw-water flows for years prior to 1980 when no data exist." This appears to be a sound statistical approach, and the use of a trend line is certainly not arbitrary.
>
> In Section 4.2.2 (p. 72-73) Dr. Spiliotopoulos offers a further criticism that "it was assumed that a well would be operated in the historical period based on a pattern similar to the more recent 'training period,' with further adjustments to account for information on the varying capacity of wells, where available." Dr. Spiliotopoulos' statement actually

> contradicts his assertion that estimates were arbitrary. Here he describes a reasoned and reasonable approach to estimating a pattern of past water use (well pumpage)—an approach that is not "arbitrary."
>
> In several additional paragraphs on p. 73 (as well as elsewhere), he repeats the claim that pumping rates were based on arbitrary assumptions. ATSDR uses sound statistical methods (such as regression and correlation) to estimate pumpage. This is neither arbitrary nor unreasonable."
>
> (Konikow 2025)

ATSDR developed and applied a sophisticated and novel pumping schedule algorithm for the nearly 100 water-supply wells serving Hadnot Point and Holcomb Boulevard. They did this by using a "training period" when pumping data are known (typically, present-day) and a "predictive period" when pumping data were unknown. Details of this methodology are provided in Telci et al. (2013)[8] and are the basis for the pumping schedules assigned to wells supplying the HP-HB service areas. Similar wells managed by the same operating authority (e.g., the Camp Lejeune Water Utilities Department) are likely to have been operated in a similar manner—however, in the early years of operations they simply were not required to maintain as detailed records (e.g., SCADA data) as would be expected today. AS does not offer a better or more reasonable approach than the one used by ATSDR.

4.2.2.1 HP-634

In Section 4.2.3 (Spiliotopoulos 2024, p. 77), AS states that model calibration was "improperly influenced" by "erroneous concentrations reported for well HP-634 ... while non-detections were ignored." Documentation and discussion below provide evidence that the concentration in well HP-634 (sampled on 1/16/1985) of 1,300 µg/L of TCE was not an erroneous concentration. Furthermore, non-detections were not ignored. They are clearly listed and labelled in many tables presented in the ATSDR reports (e.g., Maslia et al. 2013, Table A4) and in many other places in ATSDR reports (Faye et al. 2008; Faye et al. 2012).

There are certain documents that show that well HP- 634 was (temporarily) shut down on 12/10/84 when methylene chloride was found in the sample; however, the documents below demonstrate that well HP-634 was operating until early February 1985.

The first document is cited in RH's footnote 111 (Hennet 2024, p. 5-31, footnote 111) .[9] In the callout of the wells out of service on 1/16/1985, HP-634 is not among those listed, suggesting that the well was still in service on this date. January 16th is when the 1,300 µg/L sample was taken at HP-634.

---

[8] CLJA_WATERMODELING_05-00001005675 – 05_00001005810.

[9] CLJA_CLW00000004559

WELLS SHOWING NO DETECTABLE CONCENTRATIONS, ASSUMING A DETECTION LIMIT OF 10 UG/L:

606	632	640
609	633	641
611	635	642
613	636	652
614	638	653
616	639-0	655
620	639-N	LCH 4007
621		
627		

WELLS OUT OF SERVICE AND COULD NOT BE SAMPLED ON 16 JAN 1985:

610
615
654
LCH 4006

*LEGEND

a = Trichloroethylene
b = 1,2-trans-dichloroethylene
c = chloroform
d = benzene
e = bromodichloromethane
f = methylene chloride
g = toluene
h = 1,1-dichloroethane
i = tetrachloroethylene

RECEIVED
FEB 27 1985
WILMINGTON REGIONAL OFFICE
DEM

CLW
0000004559 31

- **Event #1:** Well HP-634 is tested with other wells on 12/10/1984.
- **Event #2:** Test samples from 12/10/84 are back with "Wells 634 and 637, previously showing nothing, showed significant levels of Methylene Chloride (MC). 634 and 637 were shut down."
- **Event #3:** This is a key statement: On Jan. 16, 1985, "Sampled all operating wells for HP and Holcomb Blvd Water Plant (HB). 37 wells". The key being all **operating** wells.

Further documentation that supports the fact that HP-634 was operating on 1/16/1985 when the sample was taken is provided in CLW4546,[10] which is a chronological listing of events from 11/30/1984 to 2/25/1985. A portion of that document covering 12/10/84 to 1/16/85 is shown below.

1	10 Dec	Sampled HP treated water, plus Wells 601, 602, 608, 634, 637 and 642
	13 Dec	Took Quality Control (QC) samples of 602, split three ways.
	13-19 Dec	Took daily samples of HP raw water.
2	14 Dec	Received results of 10 Dec 84 sampling (Table [2]). Treated water levels dropped. Wells 634 and 637, previously showing nothing, showed significant levels of Methylene Chloride(MC). 634 and 637 were shut down.
	19 Dec	Took a distribution sample from HP. Location was FC-540, far point from plant.
	21 Dec	Received results of daily HP samples (Table [3]), plus JTCs QC sample and FC-540. The QC samples from JTC and Grainger (received later) confirmed the presence of TCE and DCE.
3	16 Jan 85	Sampled all operating wells for HP and Holcomb Blvd Water Plant (HB). 37 wells.

On page 6 of the same document (Table [5])[11] the 37 wells tested on 1/16/85 are listed and HP-634 is on the list, and shows a sampled concentration for TCE of 1,300 µg/L.

Table [5]

LAB: JTC Sampled: 16 January 1985 Detection Limit: 10ppb

	Well	DCE	TCE	PCE	VC	11D
1	601	8.8	26	ND	ND	ND
2	634	700	1300	10	6.8	ND
3	651	3400	3200	386	655	187
4	652	ND	9.0	ND	ND	ND
5	653	ND	5.5	ND	ND	ND

None Dectected:

6	603	16	632	26	642		
7	606	17	633	27	643		
8	609	18	635	28	644		
9	611	19	636	29	646		
10	613	20	637	30	647		
11	614	21	638	31	648		
12	616	22	639(OLD)	32	650		
13	620	23	639(NEW)	33	655		
14	621	24	640	34	LCH 4007		
15	627	25	641				

Broken Samples:

35	602
36	608
37	645
	651

See Note 3.

[11] CLJA_WATERMODELING_09-0000424938

Further support for the fact that HP-634 was only temporarily closed comes from an email dated 4/11/1989 (Bates CLJ16100/CLW1818) from the Supervisory Chemist to the Director of the Natural Resources and Environmental Affairs Division with the subject "WATER MONITORING RELATED TO THE INSTALLATION RESTORATION (IR) PROGRAM".

On page 2 of the document (CLJ161101/CLW1819) bullet 6 states certain wells were tested on 12/4/1984 including HP-634:

> 6. On 4 Dec 84, the Hadnot Point Water Treatment Plant's raw and treated water was sampled as well as any drinking water wells within a mile of the Hadnot Point Fuel Farm or Bldg 602. The Bldg numbers sampled were:
>
> 601 603 608 634 642

Bullet 8 on the same page states that methylene chloride was found in wells 634 and 637 during a 2nd sampling on 12/10/1984. "The wells were temporarily closed until it was determined that the methylene chloride was probably a laboratory contaminant."

> 8. From 10-31 Dec 84, duplicate and quality control samples were run to confirm the presence of TCE, DCE and PCE in the wells. Wells 634 and 637, on the second sampling showed Methylene chloride. The wells were temporarily closed until it was determined that the methylene chloride was probably a laboratory contaminant. It was determined that all drinking water wells would be analyzed for volatile organic chemicals (VOCs) to start in January 1985.
>
> CLW 0000001819

Bullet 9 (CLJ611102/CLW1820) states 37 wells serving HP and HB were tested on 1/16/1985.

> 9. 16 Jan 85. 37 wells serving the Hadnot Point and Holcomb Blvd water plants were sampled.

Bullet 13 on the same page states "On 1 Feb 85, the 31 Jan 85 samples showed that there was still a contaminated well operating in the Hadnot Point system. The results of the 16 Jan 85 sampling were phoned into Natural Resources and showed high levels of TCE in 651." At the end of the bullet text it states, "Well 634 showed TCE also and was shut down".

> 13. On 1 Feb 85, the 31 Jan 85 samples showed that there was still a contaminated well operating in the Hadnot Point system. The results of the 16 Jan 85 sampling were phoned into Natural Resources and showed high levels of TCE in 651.
>
> Well 651 is located on the back side of DRMO's disposal storage lot. It was not initially sampled as being in proximity to a NACIP site. It had the highest levels of TCE found. The concentration was in the 17,000 to 18,000 ppb range. Well 651 was shut down. Well 634 showed TCE also and was shut down.

This statement supports the facts that HP-634 was "temporarily closed", as stated in bullet 8, and that the well was shut down for TCE - not methylene chloride.

Therefore, based on the documentation regarding water-supply well HP-634, the claims made by the DOJ Experts (Spiliotopoulos 2024, Hennet 2024) are incorrect. HP-634 was operating on the date it was sampled on Jan. 16, 1985; the result was 1,300 µg/L of TCE; and the well was shut down due to this high TCE concentration.

4.2.2.2 HP-651

RH (Hennet 2024, p. 5-28 and 5-29) posits that well data covering 11/28/1984 to 2/5/1985 (CLJA_CLW00000006590 – 6593) should be used as the basis for determining HP-651's contribution to the HPWTP finished water concentrations from 1972 to 1985. The paragraph below summarizes RH's position:

> "The average concentration measured for TCE in HP-WTP over the period January 21 to February 5, 1985,99 is 582 ug/L. During this period it is known that HP-651 was being pumped (RH, p. 4-19, Exhibit I-9). Considering that HP-651 was being pumped 39% of the time (0.39 frequency of pumping; Exhibit I-9) yields a TCE long-time average concentration of 227 ug/L for HP-WTP supplied water.
>
> 0.39 x 582 (ug/L) = 227 (ug/L)."

RH presents a table that represents the data in CLJA_CLW00000006590 – 6593 in an Excel™ spreadsheet. Using these data he determines that over the 69 days covered, well HP-651 only was operating 39% of the time so this is the value that should be used over the entire life of well HP-651, which is from 7/72 to 2/85 or 12.6 years. In doing so RH either fails to realize or does not disclose that these two months of well operation from 11/28/1984 to 2/7/1985 are anything but ordinary and therefore, should not be used as the basis for any long-term forecasting of pumping schedules. Below I discuss the reasons why the 69-day period selected by RH is not reliable and should be disregarded.

- **Point 1:**

The 11/28/1984 to 2/5/1985 period should be broken into months and not as a 69-day pumping period. The ATSDR pumping schedules are based on months as their base unit. If this is done for well HP-651 the results for days of operations and percentage of time operating are as listed in Table 4.4.

Table 4.4. Monthly pumping schedule for well HP-651, December 1984 – and January 1985.

Month	Days of Operation	Percentage on
December 1984	2	6%
January 1985	18	58%

These results should make the modeler question whether there is an explanation for the HP-651's low operation in December. The most logical explanation involves wells New 623, New 622, New 629, New 661 and New 662. These 5 wells were new wells brought online from 6/1984 to 10/1984 and represent over 1,200 (gallons per minute (gpm) of combined capacity. The frequency with which they were in operation ranged from a low of 61% to a high of 94% (Table 4.5). Certainly, the addition of these 5 new wells had an effect on the pumping schedule at HPWTP.

Table 4.5. Characteristics of New Hadnot Point Wells, June–October 1984.

[DOB, construction completion date; gpm, gallons per minute; HP, Hadnot Point; %, percent]

HP Well ID	Other Name	Well DOB	Original Capacity, in gpm	Dec 84 — Jan 85 Capacity, in gpm	Well age as of 2/85	December 84 Operating Days	%	Jan 85 Operating Days	%	Total Days	% On
611	(New 623)	8/1/1984	360	242 (9/85)	0.5	27	87%	30	97%	61	87%
614	(New 622)	6/1/1984	323	320 (9/85)	0.7	23	74%	30	97%	57	81%
621	(New 629)	10/1/1984	NA	NA	0.3	26	84%	16	52%	43	61%
627	(New 661)	8/1/1984	192	280 (10/84)	0.5	28	90%	31	100%	66	94%
639 (New)	(New 662)	10/1/1984	146	146 (10/83)	0.3	26	84%	26	84%	59	84%

- **Point 2:**

The lack of use of well HP-651 in December 1984 had nothing to do with the well's capacity as demonstrated by its capacity tests. Well HP-651 Capacity Data listed on page S1.71 of the HPHB Chapter A–Supplement 1 (Sautner et al. 2013)[12] Descriptions and Characterizations of Data Pertinent to Water-Supply Well Capacities, Histories, and Operations show the last capacity test

[12] CLJA_WATERMODELING_05-0000826112, found in CLJW_WATERMODELING_05-0000826036 – 05-0000826153

was 10/29/1984 and the well operated at 242 gpm—which ranks in the Top 10 highest capacity wells at the time.

Table 4.6. Sautner et al. (2013), p. S.71.

Well HP-651

[gpm, gallon per minute; —, no data; VOC, volatile organic compound; USGS, U.S. Geological Survey]

Date	Capacity, in gpm	Operational status	Data source
12/30/1971	200	Construction completed	Driller[1]
7/1/1972	—	In service	Estimated date
1/1976	—	In service	CLW-4039
3/31/1977	190	In service	Well capacity test
1/1978	—	In service	Operation records
1/10/1979	167	In service	Well capacity test
2/13/1980	178	In service	Well capacity test
7/26/1981	232	In service	Well capacity test
1/1982	—	In service	Operation records
9/14/1983	239	In service	Well capacity test
10/29/1984	242	In service	Well capacity test
1/1985	—	In service	Operation records
2/1985	—	"Contaminated"	Operation records
2/4/1985	—	Out of service	CLW-4913[2]
2/4/1985	—	Service terminated	CLW-4913[2]
6/1994	—	Abandonment	AH Environmental Consultants[3]

[1]Corbin Construction Company, written communication, December 30, 1971

[2]Well secured due to VOC contamination

[3]AH Environmental Consultants, Inc., electronic communication, September 3, 2004

Data sources:

CLW, Camp Lejeune Water Documents 3559–3561, 3573–3575, 3585–3587, 3588–3590, 3641–3643, 3644–3646, 3772–3774, 3775–3777, 3996–3997, 3998–4000, 4044–4046, and 4047–4049

USGS, operation records, written communication, March 2004

- **Point 3:**

When compared to other wells that were supplying raw water during that time, well HP-651's age is also not a reason for its lack of operation in December 1984. Well HP-651's completed construction date (a/k/a/ DOB) was 7/1/1972 making it only 12.6 years old as of 2/1/1985. In comparison, well HP-616 operated at 57% in December 1984 and its DOB is 1/1/1943 making it 42.1 years old on 2/1/1985. Its last capacity test placed it at 210 gpm—still substantial, especially considering its age. The same holds true for well HP-632. In December 1984 it operated at 64% at an age of 27.7 years (DOB 5/27/1957). When tested on 10/1984 its capacity was 201 gpm.

- **Point 4:**

The fact that well HP-651 only operated at 6% could also be attributed to the pumping schedule being used at the time. As outlined extensively in ATSDR's reports (Telci et al. 2013),[13] ATSDR used current (2008) pumping data as a "training period" to reconstruct well operations during the historical period ("predictive period"). On those wells that were shut down due to contamination, "surrogate wells" were used for the "training period" (Telci et al. 2013, Table S2.2)[14]. HP-651 was shut down in February 1985 so well HP-633 was used as its surrogate. If we look at the historic pumping schedule that was created for HP-651 based on HP-633 we see there is a cycle:

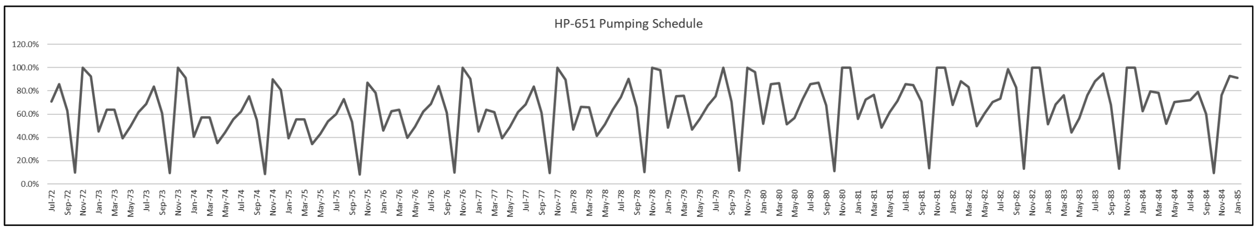

Figure 4.5. Reconstructed historical pumping operations for well HP-651 (from Telci et al. 2013)

In the reconstructed pumping operations cycle, well HP-651 drops below 10% every October. This cycling was common for several reasons, including substantial reductions in consumption and demand owing to deployment of troops and climatic conditions where October and generally Fall to early Winter are "wet months." It is very possible that the actual low-cycle month for HP-651 was December and not October, which would explain the 6% value of operation time for December of 1984.

In addition to those points outlined above there are other reasons why this period should not be used to represent normal operation of not only HP-651 but the well field in general.

- **Reason 1**

The first and foremost reason why this is not a representative time period is because November 30, 1984 marked the start of the investigation into the sources of contamination at HP. Well HP-602 was shut down on 11/30/1984. Additional testing on 12/4/1984 and 12/10/1984 resulted in well HP-608 being shut down permanently on 12/6/1984 and wells HP-634 and HP-637 being shut down temporarily on 12/14/1984. This disruption is not a normal occurrence and therefore adds to the reasons why this period of time should not be used to determine historic pumping schedules for any wells.

- **Reason 2**

As outlined in my Expert Report (Maslia 2024) the HBWTP had to be shut down from 1/27/84 to 2/7/85 due to a fuel line contaminating the HB water supply. During this time HPWTP had to supply

[13] CLJA_WATERMODELING_05-00001005675 – 05-00001005810.
[14] CLJA_WATERMODELING_05-00001005695.

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all finished water for the HB area, in addition to its own, which is not representative of normal operation.

- **Reason 3**

Based on ATSDR's research into Camp Lejeune's water treatment plant's operations, it became apparent that the WTP operators would not cease operating a 12.6-year-old well (HP-651) that at 12 years of age is still producing more than 240 gpm. In July 1972, well HP-651 would have been operated very similar to that of the new wells discussed previously—wells New 623, New 622, New 629, New 661 and New 662, which were operated at 70% – 100% capacity.

- **Reason 4**

Camp Lejeune is a military base. Therefore, production and consumption of water are determined by demands for: (a) fire protection, (b) housing , facilities, and recreation,(c) utility requirements (steam and heat production), (d) troop deployments, (e) leave for rest and relaxation, and (f) a combination of (a)-(e) above. ATSDR staff observed an example of the impact of troop deployment on production and consumption of water supplies during the conduct of a field test of the HPWTP service area during May 2004 (Sautner et al. 2005). During this field test, ATSDR requested that Camp Lejeune water utility operators increase normal water production of the HPWTP from about 1,600 gpm to about 2,100 gpm so ATSDR could conduct tracer tests. On the final day of the test, water utility staff told ATSDR that they would need to reduce production back to the 1,600 gpm at the HPWTP because they were "spilling water from the elevated storage tanks." Camp Lejeune water utility staff indicated that a substantial reduction in demand was being observed because of troop deployments.

RH's position on well HP-651 is an attempt to lower concentrations that occurred at Camp Lejeune during 1953 – 1987 using incorrect and/or select, non-representative data. RH's contentions regarding HP-634 are incorrect and the same holds true for HP-651. Supply well HP-651 was a major contributor to the raw water supply from June 1972 – February 1985, and the ATSDR reconstructed pumping schedule accurately reflects well HP-651's overall operation. RH's claim of 39% lifetime operation is made without a thorough review of the documents he is relying on to support his position.

4.3 Volatilization of VOCs During Water Treatment Process

DOJ expert (RH) posits that a substantial portion of chemicals of concern in the raw water was unavoidably lost during subsequent storage, treatment, and distribution (Hennet 2024, Section 5, Opinion 2). His report goes through numerous calculations that he claims show substantial percentages of VOCs volatilizing off during the water treatment and storage process at the WTPs (Tarawa Terrace and Hadnot Point).[15] For example, in Hennet's Exhibits 2-4 and 2-5 (2024, p. 5-6 – 5-11) he computes an "Overall Evaporative Removal" of VOCs of concern at the HPWTP as: 18.34% (PCE), 17.07% (TCE), 22.41% (1,2-tDCE), 32.48% (VC), and 15.12% (Benzene). For the TTWTP, Hennet computes the "Overall Evaporative Removal" of VOCs of concern as 18.84% (PCE), 17.63% (TCE), 23.23% (1,2-tDCE), 33.41% (VC), and 15.68% (Benzene). These calculations

[15] The Holcomb Boulevard WTP (HBWTP) was never supplied with contaminated raw water.

substantially exceed values of volatilization computed by the consultant to the U.S. Marine Corps (USMC), AH Environmental Consultants in its December 2004 report on Estimation of VOC Removal (AH Consultants 2004).[16] Specifically, Section 5 (Summary) of the AH Consultants report states:

> "The calculations revealed that VOC removal due to volatilization from quiescent basins was negligible at MCB Camp Lejeune. The only significant VOC removals must have occurred at the spiractor effluent pipe, where the falling water undergoes some aeration. Considering the uncertainty in the estimates for the fall height over the weir formed by the pipe, the removals for TCE and PCE were likely to be less than 15%."[17]

Earlier in its report, AH Environmental Consultants (2004, (pages 4-1 – 4-2) found that "volatilization due to aeration at the spiractor effluent pipe resulted in TCE and PCE removals of 6.1% and 7.7% at the design flow rate 700 gpm, respectively. ... A sensitivity analysis showed that the fall height has the largest effect on VOC removal at a weir." This sensitivity analysis conducted by AH Environmental Consultants (2004) found that removal of PCE and TCE is nearly proportional to the fall height from the spiractor. AH Environmental Consultants (2004) went on to explain that the fall height at Hadnot Point was only 1 foot but at Holcomb Blvd it was 2 feet. It was this uncertainty along with "additional uncertainties ... introduced by varying head losses in the pipes caused by calcium carbonate scale build-up and manual cleaning" that led AH Environmental Consultants (2004) to state at page 4-4 that "it is estimated that PCE and TCE removals due to aeration at the spiractor effluent pipes are likely to be *no larger than* 15%."

To assess the DOJ expert's (RH) calculations and conclusions, Dr. David R. Sabatini conducted a detailed analysis of the volatilization of VOCs for the Camp Lejeune WTPs including volatilization from mobile water units (a/k/a water buffaloes[18]), and this analysis is adopted and incorporated by reference into this report. Results of this analysis are summarized by Sabatini (2025, Section 5.1.4) for the TTWTP and HPWTP are listed Table 4.7 (Sabatini (2025, Table 5.3).

Table 4.7. From Sabatini (2025), Table 5.3.

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
Spiractor (Sec 5.1.1)	5.2	6.2	5.9	9.9	4.3
Storage tanks (Sec 5.1.2)	<1	<1	<1	<1	<1
Other losses (Sec 5.1.3)	<1	<1	<1	<1	<1
My Estimate - overall losses	**<7.2**	**<8.2**	**<7.9**	**<11.9**	**<6.3**
AH Environmental (2004), p.5-1	<15	<15	-	-	-
Hennet (2024) Exhibit 2-6, p.5.14	17	18	22	32	15

[16] CLJA_WATERMODELING_01-0000334594 – 01-0000334660.
[17] CLJ_WATERMODELING_01-0000334634.
[18] Detailed analyses and discussions of the water buffalo types used at Camp Lejeune and the filling process during the historical period of VOC exposure are provided in Appendix A to Dr. Sabatini's report and are not discussed in this report.

As Sabatini (2025) states in his report, "As such, I conclude that Hennet (2024) overestimated the potential losses in the water treatment processes. The actual loss values, in my opinion, were less than 6 to 12% for the VOCs of interest versus 15% to 32% as suggested by Hennet (2024)."

For the mobile water units (water buffaloes), Sabatini (2005, Section 5.3) concludes:

"Hennet's calculations overestimated the VOC losses during filling of the water buffaloes; he estimated 41% to 61% for the range of VOCs while I estimate much lower (15 to 22% through filler pipe/strainer and 4.2 to 6.7% through the manhole, including daily use not accounted for by Hennet) for the range of VOCs, I thus conclude that the water buffalo water was only mildly to moderately lower in VOCs, not substantially lower as Hennet (2024) states."

Sabatini's (2025), Table 5.7, provided in this report as Table 4.8, lists a summary of the overall VOC losses in water buffaloes based on Hennet's (2024) calculations and Sabatini's (2025) estimates for filling the water buffaloes from the filler tank and from the manhole cover.

Table 4.8. From Sabatini (2025), Table 5.7.

[My estimate refers to Sabatini (2025)]

Source	TCE (%)	PCE (%)	1,2-tDCE (%)	VC (%)	Bz (%)
(1) Hennet – filler pipe/strainer - Overall loss (see Table 5-6, Row 2))	41	44	54	61	45
(2) My estimate – filler pipe/strainer overall filling losses (see Table 5.6, Row 3)	14	15	18	20	15
(3) My estimate – filled by standpipe through manhole cover – 5.6% of Hennet's Row 1 values in Table 5.6	3.0	3.2	4.0	4.5	3.3
(4) My estimated losses during daily use of water buffaloes (Exhibit C.4)	1.2	1.0	1.9	2.2	1.2
(5) My estimate – overall losses – filler pipe strainer plus daily use (Row 2+4)	15	16	20	22	16
(6) My estimate – overall losses – standpipe filling through manhole plus daily use (Row 3+4)	4.2	4.2	5.9	6.7	4.5

In summary, the detailed calculations of both AH Environmental Consultants (2004) and Dr. Sabatini (2025) demonstrate that the DOJ expert (RH) has vastly overestimated alleged VOC losses during storage, treatment and distribution. In addition, RH's assertion that ATSDR did not account for such VOC losses (Hennet 2004, Opinion 10, p. 5-36) is incorrect. First, ATSDR analyzed sampling data of water from both pretreatment and post treatment. Table 4.9 lists sampling data for the HPWTP including sampling status (treated or untreated) where known. Out of the 20 water samples taken at the HPWTP, 7 were from treated (finished) water, 4 were from untreated, and 9 had unknown treatment status. Furthermore, for TCE samples taken on 7/27/1982, results show that the concentration for untreated water was 19 μg/L and for treated water was 21 μg/L. Allowing for measurement error, these data indicate no losses to volatilization of TCE during the treatment process.

Table 4.9. Treatment status of water samples from the Hadnot Point water treatment plant

Date	Measured in μg/L	Treatment Status	Reference or Citation	Bates Identification
Tetrachloroethylene (PCE)				
5/27/1982	15	Unknown	CLW 0606	CLJA_USMCGEN_0000003332
7/27/1982	100	Unknown	CLW 0606	CLJA_USMCGEN_0000003332
12/4/1984	3.9J	Treated	CLW 5632	CLJA_USMCGEN_0000009913
2/5/1985	7.5J	Treated	CLW 5509	CLJA_USMCGEN_0000005529
Trichloroethylene (TCE)				
5/27/1982	1400	Unknown	CLW 0606	CLJA_USMCGEN_0000003332
7/27/1982	19	Untreated	CLW 0606	CLJA_USMCGEN_0000003332
7/27/1982	21	Treated	CLW 0606	CLJA_USMCGEN_0000003332
12/4/1984	46	Untreated	CLW 5632	CLJA_USMCGEN_0000009914
12/4/1984	200	Treated	CLW 5632	CLJA_USMCGEN_0000009913
12/12/1984	2.3J	Treated	CLW 5644	CLJA_USMCGEN_0000003979
12/19/1984	1.2	Untreated	CLW 4546	ATSDR_WATERMODELING_01-0000886764
2/5/1985	429	Unknown	CLW 5509	CLJA_USMCGEN_0000005529
***Trans*-1,2 Dichloroethylene (1.2-tDCE)**				
12/4/1984	83	Treated	CLW 5632	CLJA_USMCGEN_0000009913
12/4/1984	15	Untreated	CLW 5632	CLJA_USMCGEN_0000009914
12/12/1984	2.3J	Treated	CLW 4546	ATSDR_WATERMODELING_01-0000886764
2/5/1985	150	Unknown	CLW 5509	CLJA_USMCGEN_0000005529
Vinyl Chloride (VC)				
2/5/1985	2.9J	Unknown	CLW 5509	CLJA_USMCGEN_0000005529
Benzene				
11/19/1985	2500	Unknown	CLW 1355	CLJA_USMCGEN_0000007001
12/10/1985	3	Unknown	CLW 1355	CLJA_USMCGEN_0000007001
12/18/1985	1	Unknown	CLW 1355	CLJA_USMCGEN_0000007001
Note 1: J = Estimated				
Note 2: Data from Faye et al. (2010, Tables C11 and C12); Maslia et al. (2013, Table A18)				

At the TTWTP a triplet of measured water samples obtained on 7/28/1982 show results as follows: 104 μg/L in "finished water", 76 μg/L in "untreated water", and 82 μg/L in "treated water",[19] indicating no PCE loss to volatilization during the treatment process.

Additionally, in contrast to RH's contention that ATSDR ignored or did not account for VOC losses during storage, treatment and distribution, this issue (including the results of the AH Environmental Consultants report [2004]) was discussed in detail with the Expert Panels convened by ATSDR in 2005 and 2009 (Maslia, 2005, 2009). During the first day of the meeting in 2005 (March 28) panel members Dr. Tom Walski (Bentley Systems) and Dr. Peter Pommerenk (AH Consultants and consultant to the USMC) responded to a question from panel member Dr. James Uber (University of Cincinnati) to Morris Maslia about whether there are any potential chemical biological processes taking place in the distribution system.[20] Additional discussion occurred during the 2009 Expert Panel meeting (April 30) by Dr. Pommerenk.[21] Excerpts from the verbatim transcript are provided in Appendix **A**. The consensus was that there was negligible volatilization (at most 10% from the spiractors). "So although we said it's probably negligible, and I agree with Tom's number here. At 90 percent, what's going in is coming out on the other end." (see Appendix **A**). In light of the conclusions of AH Environmental Consultants (2004) and the recommendations of its Expert Panels, ATSDR made the decision to consider any potential VOC losses from storage, treatment and distribution as negligible.

Additional support for this decision comes from the eight-day period, January 28-February 8, 1984, when the HBWTP was shut down and not operating. At that time, the HPWTP provided finished (and contaminated) water to the HB water-distribution system by operating booster pump 742 and opening the Marston Pavilion valve (Maslia et al. 2013, p. A2, p. A65). Water samples taken on January 31, 1985, indicated TCE concentrations ranged from 24.1 mg/L to 1,148.4 mg/L, with a sample taken at the HPWTP (Building 20, treatment status unknown) having a TCE concentration of 900 mg/L.[22] Although not a direct indication of negligible TCE loss to volatilization during the treatment process at the HPWTP, these samples, taken from the HB water-distribution system (supplied by contaminated HPWTP finished water), suggest that any loss of VOCs owing to volatilization in the treatment process were consistent with the advice of the ATSDR Expert Panels (Appendix A) and the findings of AH Environmental Consultants (2004) and Sabatini (2025).

4.4 Derivation and Computation of Sorption Parameter Values

DOJ experts AS and RH posit that selected geochemical parameters (sorption parameters) were incorrect (Spiliotopoulos 2024, Section 4.1.2.2) and that ATSDR failed to consider site data to parameterize models (Hennet 2024, Opinion 12). Both opinions are incorrect. A detailed response pertinent to sorption parameters for the TT analyses is presented below and is also provided in Konikow (2025).

ATSDR applied and calibrated the MT3DMS model to evaluate the occurrence and migration of contaminated groundwater at TT. MT3DMS, a multi-species, mass transport model, is a widely

[19] CLJA_USMCGEN_0000009869.
[20] CLJA_WATERMODELING_01-0000942379 – 01_0000942381.
[21] CLJA_WATERMODELING_02-0001111469 – 01-0001111472.
[22] CLW 4552, CLJA_WATERMODELING_09-0000424939.

used public domain model code used to simulate the migration of solutes/contaminants in groundwater (Zheng and Wang, 1996; Zheng 2010).

To account for sorption, MT3DMS computes a retardation factor (R), which, in turn, requires the selection of an equilibrium isotherm. A linear equilibrium isotherm was selected for the TT MT3DMS model. The retardation factor and the linear equilibrium isotherm are related by the following formula:

$$R_f = 1 + (K_D \times \rho_b)/n_e \qquad (1)$$

where

R_f = the retardation factor, dimensionless

K_D = the distribution coefficient, in L^3/M

ρ_b = the bulk density, in M/L^3

n_e = the effective porosity of the porous media, dimensionless

(M=mass; L=length))

The K_D is a parameter that accounts for adsorption to mineral and/or organic material in the soil. While a chemical is adsorbed to soil, it does not move with the groundwater, so that the chemical migrates through the subsurface more slowly than the average groundwater velocity. This slower chemical velocity is quantified by the retardation factor, which is the ratio of the average water velocity to the chemical velocity. A R_f of 2, for example, indicates that the chemical moves at half the average groundwater velocity because of adsorption.

As seen in Equation (1) above, the R_f depends on the product of the ρ_b (bulk density) and K_D. Different combinations of K_D and ρ_b (and effective porosity, n_e) can thus result in the same retardation factor and will calibrate a model equally well. For example, a K_D value of 0.5 and a ρ_b of 2.0 would result in the same R_f as a K_D value of 0.6 and a ρ_b of 1.67, because 0.5 x 2.0 = 1, and 0.6 x 1.67 also equal 1. Because contaminant movement in groundwater depends on the R_f, an erroneous ρ_b and an erroneous K_D can compensate for each other because they are multiplied together, resulting in a R_f that best calibrates a model even though the individual ρ_b and K_D are not correct or are unknown.

During model calibration, the ρ_b and n_e were held constant while K_D was varied (i.e., K_D is a model calibration parameter). This approach was largely dictated not only by the several divergent methodologies used to determine K_D, generally batch and column experiments, but also by the high uncertainty and variability of reported K_D values, regardless of methodology. The EPA in its Volume II of *Understanding Variation in Partition Coefficient, K_D, Values* (USEPA 1999, Volume II, p 3.4) states *"The K_D values reported in the literature for any given contaminant may vary by as much as 6 orders of magnitude."* Similarly, Spiliotopoulos (2024, Appendix A) tabulates site-specific K_D values for total organic carbon (TOC) at Camp Lejeune that vary by at least 3 orders of magnitude.

The initial K_D values used during calibration of the Tarawa Terrace MT3DMS model were derived largely from Hoffman (1995) and were determined from column experiments performed on sediment samples collected from 240 boreholes drilled into a plume contaminated with PCE and trichloroethylene (TCE). Borehole samples were composed largely of sand, silt and gravel, similar to the subsurface at Tarawa Terrace. Borehole sediments also contained low concentrations of total organic carbon. The K_D values for PCE reported by Hoffman (1995) related to silt and sand ranged from about 0.20 to 0.80 milliliters per gram (ml/g) and averaged 0.40 and 0.39 ml/g, respectively. The K_D determined from the completion of MT3DMS model calibration was 0.14 ml/g and was somewhat less than values determined by Hoffman (1995). The retardation factor (R_f) determined from MT3DMS calibration was 2.93 (Faye 2008) and is very close to other values reported in the literature for similar geologic materials (e.g., Rogers 1992)

In his report, Konikow (2025) also discusses Hennet's (2024, Opinion 11) criticism of ATSDR for having failed to consider available site-specific data for f_{oc} (fraction of organic content) to estimate K_D . However, as Konikow (2025) points out:

> "Rogers (1992, p. 51) in discussing the K_d parameter says "Numerous researchers have used theoretical methods correlating the organic carbon content (OCC) of the subsurface material and the K_d (Karickhoff, 1984). Others have used the partitioning between octanol and water to predict the K_d (Kenega, 1980). **These methods are not considered appropriate where the OCC is less than approximately 0.1%**." OCC is equivalent to TOC, and 0.1% is equivalent to a fraction or 0.001. Hennet's Expert report lists (Exhibit 3-2, and p. D-11 to D-12) 21 Camp Lejeune samples where f_{oc} is given. The median value is 0.0013, barely above the indicated limit, and 9 samples (43% of the samples) have values <0.001, indicating that the use of f_{oc} to estimate K_d is not appropriate. If ATSDR had used this approach, it would have introduced additional errors and sources of uncertainty."

Following calibration of the Tarawa Terrace MT3DMS model and the subsequent peer reviews and publication of model results, a member of the 2009 ATSDR Expert Panel (April 29–30) indicated in his pre-meeting comments on published ATSDR analyses that a wet rather than a correct dry bulk density was input to MT3DMS (Maslia 2009, p. 117)[23] . Because transport models depend on the retardation factor which, in turn, is determined by the product of K_D and bulk density (Equation 1), the erroneously high bulk density implied that the value of K_D was too low. Accordingly, project staff resumed calibration of the Tarawa Terrace MT3DMS model by assigning a corrected bulk density (ρ_b) of 1.65 g/ml (46,725 g/ft^3) to MT3DMS and testing simulated results by varying K_D values ranging from 0.20 to 0.40 g/ml (Hoffman, 1995). Test simulations were determined to be relatively insensitive to changes in K_D; however, K_D values near the low part of the range (0.20 ml/g) were determined most comparable to best calibration. Finally, a corrected TT MT3DMS model was achieved using a dry bulk density of 1.65 g/ml and applying Equation (1) to compute a paired K_D value of 0.23 ml/g, thus maintaining the calibrated retardation factor (R) of 2.93 and model results as published (Faye 2008). Thus, the initial erroneous bulk density value had no effect on the final model calibration, which depended only on the product of K_D and ρ_b through the R_f. Note, the K_D value of 0.23 ml/g input to the corrected MT3DMS model is within the lower part of the range for this value applicable for PCE published by Hoffman (1995).

[23] CLJA_UST02-0000059851

By comparison, and as Dr. Konikow discusses in his report (Konikow 2025), "Kret et al. (2015) studied a Quaternary sandy aquifer to estimate sorption coefficients for PCE fate and transport modeling. They estimated K_D from both batch and column experiments and concluded that reasonable values for R_f for PCE are typically between 1.1 and 3.6." The ATSDR calibrated value of 2.93 is very near the mean of this range. As Dr. Konikow points out, Rogers (1992) also supports the ATSDR's calibrated value. There, a groundwater transport model was developed for the Lawrence Livermore National Laboratory (LLNL) site in California, which includes "several hundred feet of complexly interbedded, unconsolidated alluvial sediments" with an upper boundary represented by an unconfined water table condition. Their calibration and history matching resulted in reasonable matches for R_f values between 1.0 and 3.0, with their conclusion that "a spatially averaged retardation factor of approximately 3 is recommended…".

The values used by Spiliotopoulos (2024) for ρ_b (1.65 g/cm^3) and for K_D (0.30 and 0.40 mL/g) result in R_f values of 3.48 and 4.30, respectively, which are on the high-side of many literature-reported values and the calibrated value of 2.93. Using the Spiliotopoulos (2024) values in effect slows the movement of PCE through the aquifer and increases the time at which PCE-contaminated groundwater arrives at water-supply wells and the TTWTP (Spiliotopoulos 2024, Figures 7 and 8). Spiliotopoulos (2024, p. 37-38) also posits a R_f of 6.44 but provides no supporting evidence or reference for this value. What Spiliotopoulos has done is in essence conduct a sensitivity analysis using R_f as the varied parameter. However, Dr. Spiliotopoulos did not adjust ρ_b and/or n_e to best calibrate the model using his higher K_D values. The higher R_f based on Dr. Spiliotopoulos' larger K_D values do not calibrate the model as well as the R_f used by the ATSDR team. In addition, as shown in Faye (2008), the calibrated TT fate and transport model is relatively insensitive to changes in R_f (K_D being the varied parameter in R_f). Instead, the model is substantially more sensitive to changes in mass loading rate and pumping variation.

ATSDR documented the above modifications to ρ_b and K_D in an email (and attachment) dated February 28, 2011.[24] ATSDR had planned to issue an errata pertinent to the updated ρ_b (dry) and K_D as a forthcoming TT Chapter K report (mentioned in the Foreword Section of all published TT reports). Agency budgetary and project completion time constraints prevented the errata and any supplemental information from being formally published and publicly released as the TT Chapter K report.

To test the effect that variations in R_f have on PCE concentrations at water-supply well TT-26 and the TTWTP, a series of simulations were conducted wherein the calibrated retardation factor of 2.93 (Faye 2008) was increased to 3.48 and 4.3 as speculated by AS and RH. As these sensitivity analyses (variations in retardation factor) demonstrate in Figure 4.6 below, the model is insensitive to changes (increases) in the retardation factor. After 1960, simulated results show PCE concentrations at TT-26 and at the TTWTP more than the MCL for PCE of 5 μg/L.

[24] ATSDR_WATERMODELING_01-0000887322 and 01-0000887324.

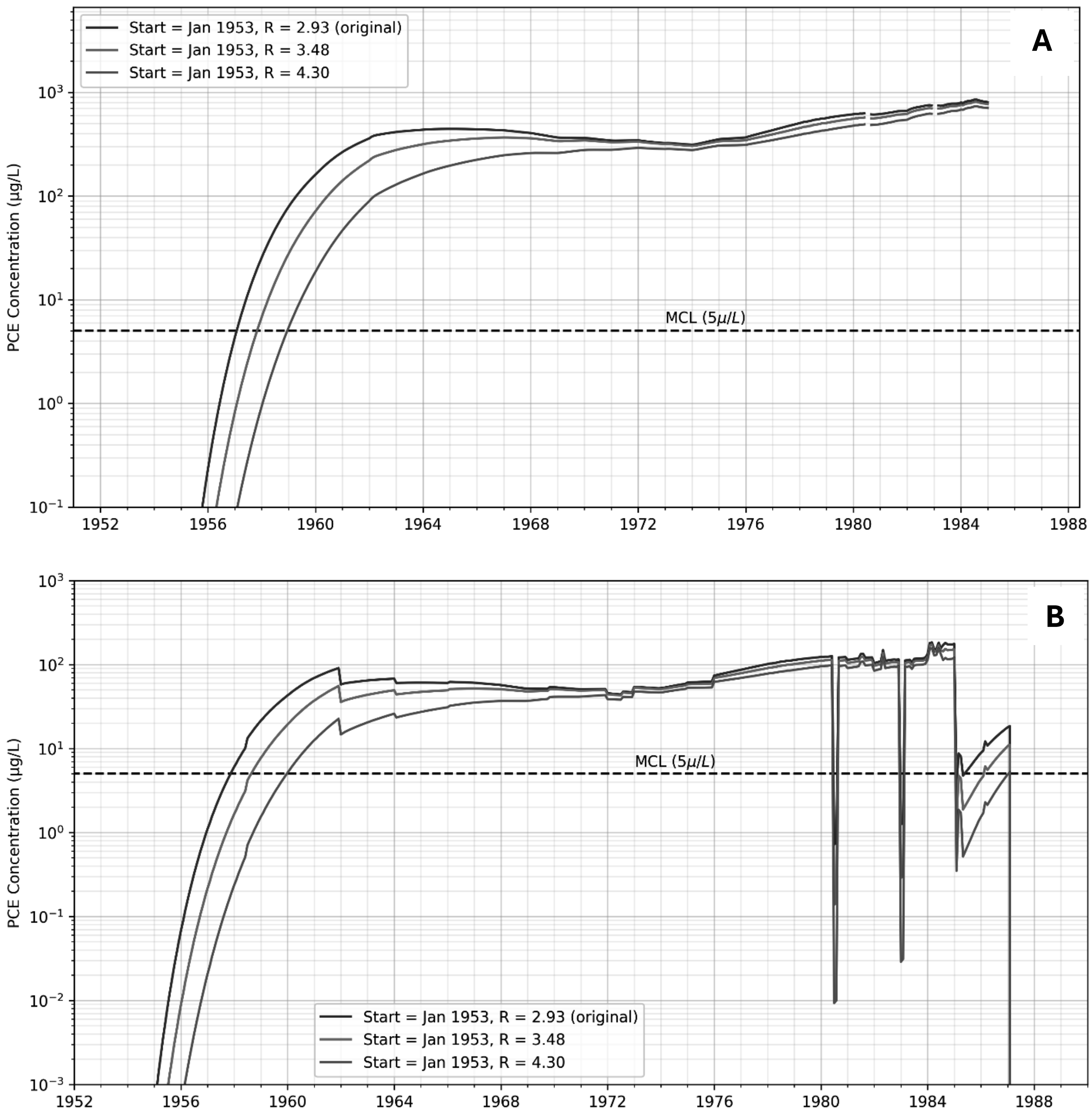

Figure 4.6. Comparison of tetrachloroethylene (PCE) reconstructed concentrations for variations in retardation factor for: (A) water-supply well TT-26, and (B) Tarawa Terrace water treatment plant (TTWTP). Note: R = 2.93 is calibrated retardation factor from Faye (2008).

4.5 Model Calibration and Uncertainty Analysis

Rebuttal responses to criticisms related to model calibration and uncertainty analysis raised by AS (2024) and RH (2024) are provided below.

4.5.1 Model Calibration

In Opinion 1, AS posits that the ATSDR models were not "calibrated to observed data for the first 30 years of simulation" (Spiliotopoulos, 2024, p. 30). However, it is crucial to understand that concentration data for that period do not exist, which is exactly why reconstruction was performed. The ATSDR models were designed to estimate those concentrations in a state-of-the-art manner, consistent with principles of groundwater flow and fate and transport processes. These models did not generate arbitrary random numbers; rather, the results are reasonable and realistic. The presence of error bands or uncertainty ranges around the estimates is to be expected and is readily acknowledged (Konikow 2025).

In his Opinion 2, AS (2024, p. 33) reproduces ATSDR's Figure F16 (Faye 2008)[25] of TT historical reconstruction results at water supply well TT-26, and states that ASTDR's work resulted in "biased high estimates." As Dr. Konikow notes, Figure F16 (provided in this report as Figure 4.4 in Section 4.2.1) illustrates the opposite and instead "shows 5 measured PCE concentrations in samples from well TT-26 collected within weeks of each other in early 1985. Over this relatively short time span, the concentrations varied greatly (bracketed between a high of 1,580 μg/L on 01/16/1985 to a low of 3.8 μg/L on 02/12/1985)—a rate of change that cannot be replicated in a model using monthly time steps. Most importantly, the plot shows that the model results fell almost exactly at the midpoint of the range of observed values (about 800 ug/L)—countering the claim of being biased high." (Konikow 2025)

The plot shown in Spiliotopoulos (2024, Figure 13) is discussed in AS's Section 4.1.3.2 (p. 50, paragraph 8). It is noted that the results of the calibrated model, as AS states, "sits at the upper bound of the retardation-factor uncertainty range." However, as Dr. Konikow notes and I agree, "that is not true for the majority of the simulation period. It is close to the middle of the range during the period of 1962 through the end (around Dec. 1987). And prior to 1962, it still lies within the uncertainty bounds, which is acceptable and not indicative of bias." (Konikow 2025). Furthermore, calibrated model results do not always lie at the center of the uncertainty band because the response of the model to some parameters can be non-linear, and a model can be insensitive to changes in a model parameter at either high or low extremes.

For water-supply well HP-651, ATSDR applied the Linear Control Model (LCM) to reconstruct concentrations of TCE, PCE, and PCE degradation products (TCE, 1,2-tDCE, and VC). In Opinion 16 (Spiliotopoulos 2024, Section 4.2.4, p. 82-83) AS argues that the model for volatile organic compound (VOC) degradation products was based on limited data, and ATSDR's historical reconstruction prior to December 1984 "cannot be verified."

[25] Figure 4.4 of this report, previously discussed in Section 4.2.1

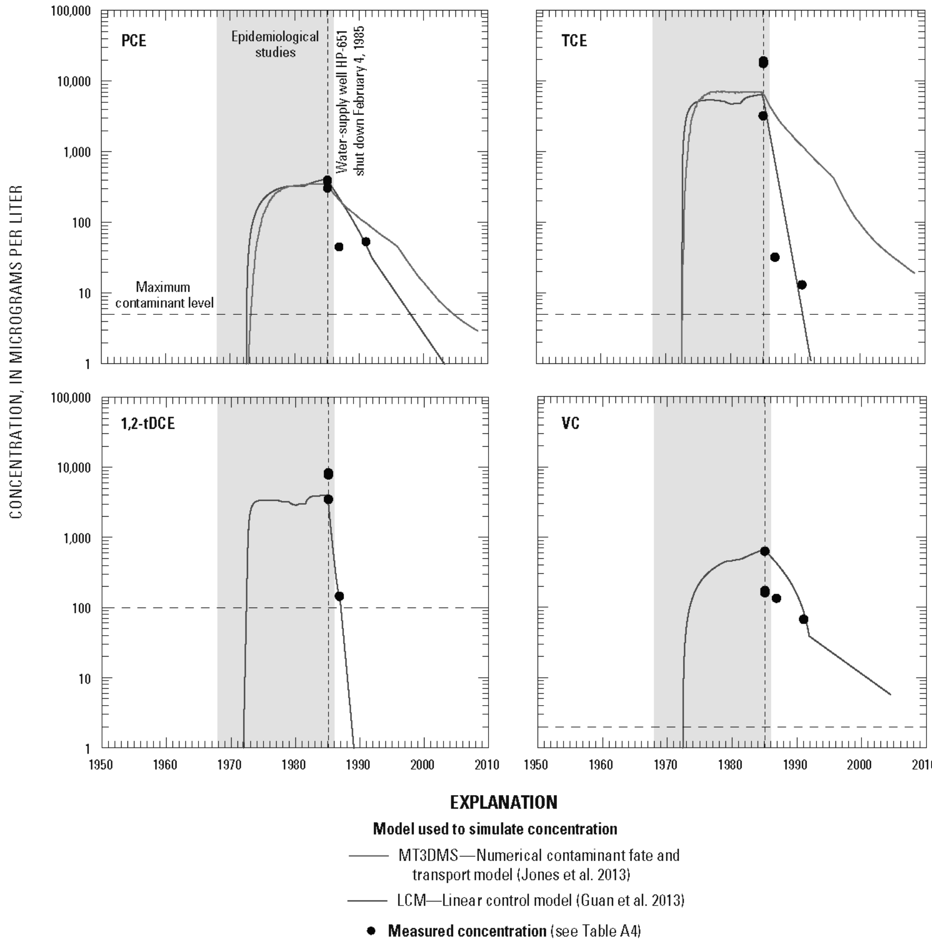

Figure A25. Reconstructed (simulated) concentrations of tetrachloroethylene (PCE), trichloroethylene (TCE), *trans*-1,2-dichloroethylene (1,2-tDCE), and vinyl chloride (VC) at water-supply well HP-651 using numerical (MT3DMS) and linear control methodology (TechControl) models, Hadnot Point–Holcomb Boulevard study area, U.S. Marine Corps Base Camp Lejeune, North Carolina. (See Figure A14 for well location.)

Figure 4.7. From Maslia et al. (2013), Figure A25.

In section 4.2.4 (p. 82-83), AS states that "As illustrated in Figure 33 [ATSDR Figure A25], the historical reconstruction prior to 1985 cannot be verified, due to lack of observed data for the period." As I have stated previously, and as Dr. Konikow also opines, this is the reason why a simulation model was needed and was developed. For the four contaminants shown in Figure 4.7 the agreement between simulated values and observed data where data was available is excellent in all four plots. If anything, the model results for TCE and 1,2-tDCE are below the peak sampled data points, again suggesting that the model is under-predicting these concentrations. "This close agreement when observations are available builds confidence in the reliability of the model and its predictions," including for the historical reconstruction results for times prior to 1985. (Konikow 2025). The objective was to use a technically sound model that would be calibrated to available data in and after 1985, and to estimate the values during the 15 or so years prior to that calibration period to inform the epidemiological studies.

The objective was to use a technically sound model that could be calibrated to available data in and after 1985 and to estimate the values during the 15 or so years prior to that calibration period to inform the epidemiological studies. As Konikow (2025) observes, for PCE and TCE, the fit with the LCM model was slightly better than with the MT3DMS model, which was not designed to simulate degradation products. The excellent quality of the fit is illustrated in Figure 4.7.

4.5.2 Uncertainty Analysis

ATSDR is transparent in its analyses and publications that uncertainty exists about conditions during both the historical reconstruction and calibration period. Results include assessments of uncertainty (Maslia et al. 2007, p. A52; Maslia et al. 2013, p. A92), including an entire Chapter Report (Chapter I) in the Tarawa Terrace report series (Maslia et al. 2009). In fact, the EPA in its Superfund Exposure Assessment Manual (1988, Section 4.4), discusses "Approaches for Dealing with Uncertainty" and the use and application of sensitivity analysis and Monte-Carlo (MC) simulation.

In his Opinion 8 (Section 4.1.3.2, p. 50, paragraph 3), AS criticizes the Monte Carlo (MC) simulation approach used by ATSDR "… because ATSDR implemented a 'probability distribution function' … to describe how values closer to the mean value of the range are more probable than those away from the mean." This is not a problem or issue as posited by AS, but rather, this is one of several accepted methods "for random sampling of parameter values for a MC analysis when information or theory indicates that a parameter has a statistically normal or log-normal distribution." (Konikow 2025). Tung and Yen (2005, Section 6.1, p. 213) state, ". . . due to the complexity of physical systems and mathematical functions, derivation of the exact solution for the probabilistic characteristics of the system response is difficult, if not impossible. In such cases, Monte Carlo simulation is a viable tool to provide numerical estimations of the stochastic features of the system response." Additionally, Bobba et al. (1995) state, "A Monte Carlo model is basically constituted by a deterministic portion (the deterministic model), of variable complexity, that is used to represent mathematically the system under observation, and a probabilistic portion, constituted by the probability distributions of both the parameters of the deterministic model (if available) and the observed variables (conditions)."

In Section 4, Basis for Opinions (p. 29), AS quotes Dr. T.P. Clement's comments about ATSDR's uncertainty analysis (Clement, 2011): "The figure also shows that closer to the initial starting point, the confidence band is almost 100%, implying that our knowledge of initial conditions, initial source loadings, and initial stresses is almost exact." Contrary to Dr. Clement's observations, both Dr. Konikow and I are confident that there was no (or negligible) PCE in the groundwater from ABC One-Hour Cleaners (or any other source) prior to January 1953, and likely very little for several months thereafter. (see Konikow 2025)

Additionally, uncertainty analysis is a process associated with simulations (Bobb et al. 1995). One cannot produce an uncertainty band at the start of simulations. If there is no simulation, there is no uncertainty. Thus, uncertainty at the start is zero when there is no simulation, and it expands as the computation process progresses forward. ATSDR did not consider uncertainty at the start of our source characterization. Instead, ATSDR assumed that prior to the start of operations at ABC One-Hour Cleaners, the concentration of PCE in groundwater was perfectly known, and it was 0 μg/L.

Another point to be made is that the graph in question in AS's critique (Maslia et al. 2007, Figure A26)[26] is the concentration time history at the TTWTP. This plot was created using a mass balance equation:

$$C_{TTWTP} = \frac{\sum_{i=1}^{NW} C_i \, Q_i}{\sum_{i=1}^{NW} Q_i} \qquad (2)$$

where C_{TTWTP} is the concentration of water at the TTWTP for a specific month, *NW* is the number of operating wells for a specific month, C_i is the concentration of well *i* for a specific month, and Q_i is the pumping rate of well *i* for a specific month, featuring water pumped from a variety of supply wells. Most of the PCE comes from Well TT-26. All these wells are down-gradient from the source at ABC One-Hour Cleaners. While the fringe of the plume with very low concentrations arrives fairly soon, it takes several years for the bulk of the plume to arrive. Consequently, the parameter variations in the model instances within the MC simulation will lead to variations in the PCE plume. However, these variations do not manifest at the TTWTP for several years. Therefore, a narrow band early in the TTWTP timeline is expected. Even with the application of source concentration variations by ATSDR, the uncertainty band at the TTWTP would remain relatively narrow in the initial years.

In summary, ATSDR used and applied an accepted methodology for conducting an uncertainty analysis—Monte Carlo simulation using probability distribution functions. This method is described in several references including EPA's Superfund Exposure Assessment Manual (1988, Section 4.4), Tung and Yen (2005), and Zheng and Bennet (2002, p. 353). ATSDR provided specific details on how it carried out its uncertainty analysis with respect to both groundwater-flow model and contaminant fate and transport model parameters (and assigned probability distributions) in the Tarawa Terrace Chapter I report (Maslia et al. 2009, p. I30).[27] I agree with Dr. Konikow's assessment of the ATSDR uncertainty analysis where he states:

> "I do not see a problem here as this is an option within standard practice for random sampling of parameter values for a MC analysis when information or theory indicates that a parameter has a statistically normal or log-normal distribution. Zheng & Bennett (2002, p. 353) say "The Monte Carlo method is by far the most commonly used method for analysis of uncertainty associated with complex numerical methods." They further state (p. 356) "The heart of the Monte Carlo method is the generation of multiple realizations (or samples) of input parameters that are considered to be random variables. Each random variable is assumed to follow a certain probabilistic model characterized by its probability density function (PDF). The probability distributions commonly used in hydrogeologic studies include *normal*, *lognormal*, *exponential*, *uniform*, *triangular*, *Poisson*, and *beta* distributions." It is worth noting that when this book was published, co-author Bennett was an employee of SSP&A and first author Zheng was a former employee and affiliate of SSP&A" (Konikow 2025).

[26] ATSDR_WATERMODELING_01-0000909018.

[27] CLJA_WATERMODELING_01-0000772752.

4.6 Post-Audit of the ATSDR Tarawa Terrace Models

Jones and Davis (2024) conducted a post-audit of the Tarawa Terrace groundwater flow and contaminant fate and transport models by extending the TT simulations from 1995–2008 using additional ABC One-Hour Cleaners site data that had become available after ATSDR published results for TT in July 2007 (Maslia et al. 2007). Jones and Davis (2024, Executive Summary) state,

"In summary, this post-audit found that the original Tarawa Terrace groundwater flow and transport models were developed using sound methodology and continue to provide reliable insights into the migration of PCE contamination. Despite the inherent challenges in simulating complex subsurface conditions and dealing with incomplete data, the model effectively simulates long-term trends in contaminant migration. Based on this post-audit, we can find no significant evidence that would invalidate the analyses performed by ATSDR with the original model."

In his Opinion 13, AS states "Prior to offering opinions as experts in this litigation, Mr. Maslia and Dr. Aral should have used the data that Dr. Jones and Mr. Davis used to conduct the Tarawa Terrace Flow and Transport Model Post-Audit to update the calibration of the dose reconstruction groundwater model." (Spiliotopoulos 2024, p. 3).

There are few post-audits for calibrated contaminant fate and transport models to compare approaches with the Tarawa Terrace post-audit (e.g., Person and Konikow, 1986). Most post-audits have been conducted for calibrated groundwater-flow models. The literature on post-audits of groundwater and hydrological model predictions remains limited (Kidmose et al., 2023). Anderson and Woessner (1992) reviewed five post-audits from the 1990s and concluded that original model failures were primarily due to errors in conceptual models or defining future stress (such as pumping).

In reviewing the literature on post-audits (Alley and Emery, 1986; Konikow, 1986; Kidmose et al., 2023), the outcomes are generally used to identify where additional data are required and to enhance the understanding of hydrogeology and transport phenomena (conceptual model improvement). Post-audits are not necessarily conducted, as AS posits in his Opinion 13, to re-calibrate or update a calibrated model based on additional (and future) data.

Alley and Emery (1986) provide general perspectives on groundwater modeling gained from post-audit analysis, noting that "post-audit analysis of groundwater modeling studies is a valuable exercise, particularly considering that historically groundwater modeling studies have not included a strong model verification stage." In conducting a post-audit of a solute-transport model, Person and Konikow (1986) concluded that "the nature of the errors indicated a need to incorporate an additional process into the model (salt transport through the unsaturated zone)."

In extending ATSDR's original TT groundwater-flow and contaminant fate and transport model, Jones and Davis used additional site data such as recovery-well locations and operations, additional monitor-well locations, changes in recharge during the post-audit period (1995–2008), and observed PCE concentration data. Re-calibration of the TT models was not an objective and would not have yielded substantive changes to the original ATSDR results and conclusions because no conceptual model flaws (groundwater flow and contaminate fate and transport) were noted. Thus, AS's Opinion 13 is a moot point.

Finally, it needs to be noted that after the publication of ATSDR's TT Models in 2007 (Maslia et al. 2007)[28], ATSDR modeling staff recognized the value of conducting a post-audit of the TT models and they communicated this to ATSDR Senior Management and representatives of EPA Reion IV. The extension of the TT models from 1994–2007 would have required additional agency resources, modeling time, and coordination with the EPA (Region IV) to obtain all the additional data required for the post-audit.[29]

4.7 Graphing and Visualization of Data and Model Results

Konikow (2025) discusses AS's position that the presentation of results of the uncertainty analysis conducted by ATSDR for the TT model is "visually misleading" (Spiliotopoulos, 2024, Section 4.1.3.1). I agree with Dr. Konikow. The cited reason is that "they used a logarithmic scale, which visually compresses the uncertainty range around their calibrated model [results]." However, as Dr. Konikow notes, using a logarithmic scale is an accepted and common approach in engineering and scientific studies, and it is not considered misleading by scientists and engineers. Concentration data often vary over many orders of magnitude, which is why it is frequently presented using a log scale.

Furthermore, AS notes that the plot ranges over six orders of magnitude on the axis for PCE concentration, yet the width of the uncertainty bands does not span an equally wide range. Again, I concur with Dr. Konikow: "When values span such a large range, it is normal and standard to use a log plot. Using just an arithmetic scale would effectively hide all the changes in the lower part of the scale." (Konikow 2025)

AS also states (p. 46, para. 4) that "the difference between the high and low values in his Figure 11 (Maslia et al., 2009, Figure I29) is not significant enough to justify the use of a logarithmic scale." However, because the observed values span more than two orders of magnitude (excluding non-detects) and the simulated values span more than five orders of magnitude, plotting these data and results using a logarithmic scale is reasonable and informative. It is the only way to portray the early time results of the simulation in the same graphic (Konikow 2025).

4.8 Non-Degraded and Degraded PCE Historical Reconstructions

In his Summary of Opinions 10 and 11, Spiliotopoulos (2024, Section 4.1.4, p. 58) states,

"ATSDR applied two different numerical codes for modeling dose reconstruction. The results of the two codes are not in agreement. This is due, in part, to inconsistent application of contaminant source terms in the two models. Neither ATSDR, Mr. Maslia, nor Dr. Aral, provided sufficient scientific justification for selecting the higher estimated monthly contaminant concentrations for their dose reconstruction".

ATSDR has been open and transparent about the application of different models to reconstruct historical concentrations of PCE and PCE degradation products (TCE, 1,2-tDCE, and VC). All models are approximations of the real world and site-specific conditions, and modeling objectives determine the simplicity or complexity of a model to be used. Models that include different

[28] Results of the Tarawa Terrace models were publicly release during July 2007.
[29] CLJA_WATERMODELING_01-0000840256 – 01-0000840257; CLJA_WATERMODELING_01-0000070593, 01-0000070594, 01-0000065999, 01-0000021042, 01-0000837170 – 01-0000837172; CLJA_WATERMODELLING_01-0000837170 – 01-0000837171.

physical processes will naturally produce different results. This is an accepted modeling approach practiced by groundwater modelers. In the TT Chapter A report, Summary and Conclusions section (Maslia et al. 2007, p. A70)[30], both the non-degraded analysis for PCE (MODFLOW/MTDMS) and the degraded analysis for PCE (TechFlowMP) are discussed and summarized. ATSDR did not, as AS states "select[ing] the higher estimated monthly contaminant concentrations for their dose reconstruction" (Spiliotopoulos 2024). The water-modeling staff, being blinded to the epidemiological study through the entire water-modeling process, provided both the non-degraded (MODFLOW/MT3DMS) and degraded (TechFLOWMP) historical reconstruction results to the ATSDR health studies staff.

For the Tarawa Terrace historical reconstruction analysis, ATSDR applied a simplification of the biochemical processes such as volatilization and biodegradation taking place in the subsurface and used a model (MODFLOW/MT3DMS) that does not consider the biodegradation of PCE. ATSDR's philosophy was to "start simple" to try to understand aquifer and transport characteristics before attempting a more complex modeling effort that included biochemical processes such as volatilization and biodegradation of PCE. Again, this is a common and accepted modeling approach. Using a four-stage, hierarchical calibration approach, ATSDR achieved acceptable or better calibrations for predevelopment and transient groundwater flow, contaminant fate and transport (using MT3DMS), and the simple mixing model, as evidenced by the comparison of reconstructed and observed PCE concentrations at the TTWTP (Maslia et al., 2007, Figure A39; Fay 2008, Table F14 and Figure F27). Table 4.10 of this report, which is taken from Faye (2008, Table F14), shows that the model achieves acceptable matches between reconstructed and observed PCE concentrations at the TTWTP. In fact, even for observed non-detections, most reconstructed PCE concentrations are within the published detection limits (a non-detect does not imply zero concentration, but that the sampling and testing methodologies were not sensitive enough to detect concentrations). At the TTWTP storage tank (STT-39), the reconstructed PCE concentration was 176 μg/L compared to an observed PCE concentration of 215 μg/L—quite an impressive match for water-quality data—resulting in a geometric model bias of solely 1.5 (Maslia et al. 2007).[31]

[30] ATSDR_WATERMODELING_01-0000909028.

[31] ATSDR_WATERMODELING_01-0000908983 – 01-0000908984.

Table 4.10. From Faye (2008). Table F.14.

Table F14. Computed and observed tetrachloroethylene (PCE) concentrations in water samples collected at the Tarawa Terrace water treatment plant and calibration target range, U.S. Marine Corps Base Camp Lejeune, North Carolina.

[µg/L, microgram per liter; TTWTP, Tarawa Terrace water treatment plant; ND, not detected]

Date	PCE concentration, in µg/L		Calibration target range, in µg/L
	Computed[1]	Observed	
	[2]TTWTP Building TT-38		
5/27/1982	148	180	25–253
7/28/1982	112	[3]104	33–329
7/28/1982	112	[3]76	24–240
7/28/1982	112	[3]82	26–259
2/5/1985	176	[3,4]80	25–253
2/13/1985	3.6	[5]ND	0–10
2/19/1985	3.6	[6]ND	0–2
2/22/1985	3.6	[5]ND	0–10
3/11/1985	8.7	[6]ND	0–2
3/12/1985	8.7	[6,7]6.6	2.1–21
3/12/1985	8.7	[6,8]21.3	6.7–67
4/22/1985	8.1	[5]1	0.3–3.2
4/23/1985	8.1	[5]ND	0–10
4/29/1985	8.1	[5]3.7	1.2–11.7
5/15/1985	4.8	[5]ND	0–10
7/1/1985	5.5	[5]ND	0–10
7/8/1985	5.5	[5]ND	0–10
7/23/1985	5.5	[5]ND	0–10
7/31/1985	5.5	[5]ND	0–10
8/19/1985	6.0	[5]ND	0–10
9/11/1985	6.0	[5]ND	0–10
9/17/1985	6.0	[5]ND	0–10
9/24/1985	6.0	[5]ND	0–10
10/29/1985	6.0	[5]ND	0–10
	[2]TTWTP Tank STT-39		
2/11/1985	176	[5]215	0–10

[1]Weighted-average computation
[2]See Plate 1, Chapter A report, for location (Maslia et al. 2007)
[3]Detection limit is unknown
[4]Analysis of tap water sample for Tarawa Terrace, address unknown
[5]Detection limit = 10 µg/L
[6]Detection limit = 2 µg/L
[7]Sample collected downstream of TTWTP reservoir after operating well TT-23 for 24 hours
[8]Sample collected upstream of TTWTP reservoir after operating well TT-23 for 22 hours

Next, ATSDR set out to apply a more complex and more sophisticated approximation of transport in the subsurface by using a model that would degrade PCE into TCE, 1,2-tDCE, and VC. As PCE migrates in the subsurface it continues to undergo transformation through physical and biochemical processes such as volatilization and biodegradation. To quantify historical concentrations of PCE degradation by-products observed in groundwater samples reported in Faye and Green, Jr. (2007, Figures E1-E14) and in soil (vapor phase) requires a model capable of simulating multiphase flow and multispecies mass transport such as TechFlowMP (Jang and Aral 2008). ATSDR summarized the second and more complex modeling approach in Maslia et al. (2007, p. A41) and described the detailed development and application of the TechFlowMP model at Tarawa Terrace in Jang and Aral (2008). MT3DMS and TechFlowMP use two entirely different numerical schemes. MT3DMS uses a finite difference scheme to approximate the partial differential equations of saturated groundwater flow and contaminant fate and transport. TechFlowMP uses a Galerkin finite-element based approach with upstream weighting and mass lumping of the time derivative matrices to simulate multiphase flow and multispecies mass transport in the vadose zone and saturated zone.

To simulate groundwater flow conditions at TT, TechflowMP applied the calibrated hydraulic and aquifer properties from MODFLOW, reported in Maslia et al. (2007, Table A11). A correlation between geologic and hydrologic units and the MODFLOW/MTD3DMS and TechflowMP models is provided in Jang and Aral (Table G1), with the main difference between the two modeling approaches being that TechFlowMP has 5 layers assigned to the variably saturated zone. For predevelopment and transient groundwater flow, TechFLowMP applied the same initial and boundary conditions and pumping schedules used in MODFLOW reported in Faye and Valenzuela (2007). Comparisons of simulated groundwater heads between the TechFlowMP and MODFLOW-96 models show good agreement, and comparisons between the two modeling approaches are shown in Jang and Aral (2008, Figure G3) for model layers 1, 3, and 5 (main water-bearing units). Slight differences between groundwater-head simulations obtained using the two models were most likely due to the different numerical methods used by the two models to approximate the equations of groundwater flow. Recall that TechFlowMP uses a finite-element technique, whereas MODFLOW uses a finite-difference technique.

As discussed above, the TechFlowMP model uses a more complex approach for simulating fate and transport of biochemical processes such as volatilization and biodegradation taking place in the subsurface. Additional chemical and physical properties required by TechFLowMP for PCE and its degradation products (TCE, 1,2-tDCE, and VC) are listed in Jang and Aral (2008, Table G2). Other fate and transport properties used for the MT3DMS simulation are listed in Maslia et al. (2007, Table A11). For the source concentration (PCE) at ABC One-Hour Cleaners, MT3DMS applied a mass-loading rate of 1,200 g/d (calibrated) to the saturated zone (MODFLW/MT3DMS model Layer 1). At ABC One-Hour Cleaners the altitude of the source ranges from 0 to 13 ft, which implies that in TechFlowMP the source PCE was partially released into the unsaturated zone and partially released into the saturated zone.

PCE concentrations simulated by TechFlowMP are less than those using MT3DMS (Maslia et al. 2007, Appendix A2; Expert Report of M. Maslia (2024, Appendix H1). This is partially due to TechFlowMP simulating (1) the release of PCE from the subsurface (groundwater) to the atmosphere, (2) PCE partitioning from the water phase to the soil vapor phase, and (3) the placement of the contaminant source at the ABC One-Hour Cleaners site in the unsaturated and saturated zones. The difference between MT3DMS and TechFlowMP in simulating PCE transport at Tarawa Terrace and vicinity is (1) TechFlowMP considers PCE in both water and gas phases while MT3DMS considers PCE only in the water phase and (2) in MT3DMS the source concentration is released solely to the saturated zone. In MT3DMS simulations (Faye 2008), there is no PCE transfer into the gas phase. In TechFlowMP simulations, however, because PCE could be present in the gas phase, a portion of PCE in the gas phase could be released from the subsurface into the atmosphere through the ground surface. This results in the reduction of PCE concentration in the subsurface. The differences in simulated PCE concentrations at Tarawa Terrrace were clearly and transparently presented by ATSDR in Appendix A2 (Maslia et al. 2007) and in the Expert Report of Maslia (2024, Appendix H1). In these appendices, column 3 represents the MODFLOW/MT3DMS simulation of PCE whereas column 4 represents the TechFlowMP simulation of PCE (the same simple mixing model was applied to both simulation methods to obtain PCE concentrations at the TTWTP).

Based on the explanations given above for simulated PCE differences between MODFLOW/MT3DMS and TechFlowMP, it is not clear, evident, or apparent what issue Spiliotopoulos (2024, p. 55) has with simulating different concentrations of PCE using the two different modeling methods. The simulated PCE concentrations using MODFLOW/MT3DMS and TechFlowMP must be different and the PCE concentrations simulated by TechFlowMP should be (and were) less than those simulated by MODFLOW/MT3DMS.

4.9 Additional Topics

Below I briefly respond to several additional topics raised in the Expert reports of AS (Spiliotopoulos 2024) and RH (Hennet 2024).

4.9.1 Benzene Contamination

RH posits in his Opinion 4 that the TTWTP was likely not contaminated with benzene (Hennet 2024, p. 5-22). I agree with that opinion because ATSDR analyses indicated that benzene was not detected or detected at trace levels at the TTWTP.

RH posits incorrectly in his Opinion 6 (Hennet 2024, p. 5-32) that the HPWTP was likely not contaminated with benzene. He bases this opinion on a flawed and erroneous assumption that water-supply well HP-602 was operated solely 39% of the time (frequency of use of 0.39). This is the same flawed reasoning that RH used for water-supply well HP-651and which I conclusively discredit (see Section 4.2.2.4 in my report).

Well HP-602's operational log demonstrates the well's long-term operation; even with short-term operation and repairs, it was kept as part of the group of operating wells, even though it was not a high-volume producing well (Sautner et al., 2013, p. S1.17).[32] The last three capacity tests for well HP-602, however, indicated capacities of 130 gpm (8/17/1983), 100 gpm (6/20/1984), and 154 gpm (10/24/1984).

[32] CLJA_WATERMODELING_05-0000826058.

RH's claim that benzene is a recent short-term event does not consider the expansive remediation effort that has taken place at the HPIA and HPFF (Faye et al. 2010, p. C26)[33] and the volumes of estimated benzene in the subsurface as discussed below.

Measured concentrations of benzene have been documented. HPHB Chapter C (Faye et al. 2013), Figure C34[34] shows substantial benzene concentrations from samples within the HPIA. Table C80 (Faye et al 2013)[35] shows substantive benzene concentrations at IRP Sites: 6 (32J μg/L), 22 (29,000 μg/L), 78 (HPIA, 5,500 μg/L), 84 (3,800 μg/L), and 94 (17,300 μg/L). In addition the model TechNAPLVol (Jang et al. 2013)[36] confirmed previous LNAPL (floating benzene) volumes using the SpillCAD™ model (Engineering Science & Technology 1993) and Order of Magnitude analysis (CH2M HILL 2001). Additionally, Faye et al. (2013, Table D10)[37] summarize BTEX contaminants at selected RCRA investigations sites and occurrences of BTEX in nearby supply wells for the HP-HB area—HP-608 (Buildings 1502 and 1601), and HP-602 (HPFF, Building 1115, and Michael Road Fuel Farm). Three samples at the HPWTP, collected after all contaminated water-supply wells had been removed from service show the following benzene concentrations: 11/19/1985 (2,500 μg/L), 12/10/1985 (38 μg/L), and 12/18/1985 (1.0 μg/L). These data in addition to the erroneous assumption of a 39% operational frequency for well HP-602 demonstrate the flaw in RH's logic and reasoning that the HPWTP was likely not contaminated with benzene.

4.9.2 Site-Specific Data

Both RH and AS posit that ATSDR did not consider site-specific data to parametrize models (RH Opinion #11, page 5-37). Their *only* example of this is ATSDR not using site-specific f_{oc} data, and that has been rebutted above in the section on Derivation and Computation of Sorption Parameter Values. ATSDR provided a long and comprehensive list of documents and data that it used for the historical reconstruction analysis (Maslia et al. 2013, Appendix A2)[38], whose title is "Information sources used to extract model-specific data for historical reconstruction analysis." Examples of the site-specific data sources include water-quality laboratory analyses by Granger laboratory, JTC environmental laboratories, the CERCLA Administrative Record files, solid waste management unit reports, installation restoration program site reports, as well as hundreds of consulting reports providing site-specific data (e.g., AH Environmental Consultants, Baker Environmental, CH2HILL). The claim by AS and RH that ATSDR did not use site-specific data is simply false.

4.9.3 Travel Time for PCE to Reach TT-26

RH posits that travel time to TT-26 is in the range of 15-25 years (RH 2024, p. 5-15, 5-16, 5-22, and his Attachment D). Konikow (2025) provides a detailed discussion and response to RH, with which I agree and provide below:

> "Dr. Hennet estimates a range of values for travel times of PCE between ABC Cleaners and TT-26 that are stated to be "in the 15 to 25 years range", based on three assumed

[33] CLJA_WATERMODELING_05-0000777129.
[34] CLJA_WATERMODELING_05-0000777170.
[35] CLJA_WATERMODELING_05-0000777384.
[36] CLJA_WATERMODELING_05-0001005553.
[37] CLJA_WATERMODELING_05-0001004009.
[38] CLJA_WATERMODELING_05-0000777681 – 05-0000777688.

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"representative" flow paths, indicating the arrival didn't occur until the 1970s. He presents supporting material and calculations in his Attachment D. Dr. Hennet assumes the horizontal travel distance in the shallow aquifer is either (1) 200 ft in the shallow aquifer and 800 ft in the pumped aquifer, (2) 500 ft in the shallow aquifer and 500 ft in the pumped aquifer, or (3) 800 ft in the shallow aquifer and 200 ft in the pumped aquifer. He further assumes that the hydraulic gradient in the layer 2 confining unit is the same in all cases (i.e., at three different distances from the pumping well). This is not a reasonable assumption (for example, see TT Figs. C19 & C21). In the pumped aquifer, a cone of depression will form with lowest heads adjacent to the well and higher heads further from the well. In the shallow aquifer, the heads will not change much due to pumping in the deeper aquifer. This drawdown effect is strongest near the well, and results in a greater hydraulic gradient (and faster velocity) across the confining layer closer to the well.

Pumping also results in a steeper horizontal gradient (and faster velocity) closer to the well in model layer 3, and a shallower gradient further from the well. Dr. Hennet's calculations assume the same horizontal velocity in the pumped aquifer regardless of the distance from the pumped well, which is not a valid assumption.

Examining the heads for model layers 1 and 3 as shown in TT Figs. C18 and C19, and looking at a point about halfway between ABC Cleaners and TT-26 and at a point very close to TT-26, the head difference between the two layers (across the confining bed) is about 10' – 9' = 1 ft at the halfway location and about 5' – 2' = 3 ft at a location close to TT-26. Therefore, the hydraulic gradient potentially driving downward flow is about 3 times greater close to the well than it is halfway between the well and the contaminant source. So this large spatial change in vertical hydraulic gradient must be accounted for, and the assumption that it is the same at all locations cannot be supported. Dr. Hennet does not account for the steeper vertical gradient in layer 2 for the path closer to the pumped well, nor does he account for the faster velocity in layer 3 when the travel distance is only 200 ft.

It is more likely that the travel distance in the shallower aquifer for much of the contaminated shallow groundwater would be more than 800 ft and the corresponding travel distance in the pumped aquifer would be less than 200 ft because (1) the vertically downward transport is more likely to occur where the vertical gradient is the strongest in the confining layer, which is closest to the pumping well, (2) the downward velocity would be fastest where the gradient is steeper close to TT-26, and (3) according to Dr. Hennet's calculations, the downward flux is only about 5% of the horizontal flux in the shallow aquifer, so that even if some contaminant leaked downward at further upgradient distances from TT-26, much would remain in the shallow aquifer to migrate to locations closer to, or even adjacent to, TT-26, where downward leakage would be the fastest. Thus, Dr. Hennet's three "representative" flow paths did not include a more critical flow path in which travel in the shallower aquifer is close to 1,000 ft. For this critical flow path, the travel time would be much less than 15 years—on the order of 3.5 to 5 years. For these several reasons, Dr. Hennet's estimates of travel times from ABC to TT-26 are erroneous, misleading, biased-high, and based on unreliable assumptions." (Konikow 2025).

Based on my and Dr. Konikow's analysis, a summary of my response to RH is as follows:

- **Travel Time Estimates**: RH estimates a 15–25-year range for PCE travel time between ABC Cleaners and TT-26, but his calculations show a 14.9-19.7-year range.
- **Retardation Factor**: RH uses a retardation factor of 3.5, whereas the calibrated value for the TT model is 2.9, overestimating travel times by 20%.
- **Horizontal Travel Distance**: RH assumes horizontal travel distances of either 500 ft in both the shallow and pumped aquifers or 800 ft in the shallow aquifer and 200 ft in the pumped aquifer.
- **Hydraulic Gradient Assumptions**: RH incorrectly assumes consistent hydraulic gradients in layer 2's confining unit at both distances from the pumping well.
- **Cone of Depression**: In the pumped aquifer, a cone of depression forms with the lowest heads near the well and higher heads farther away.
- **Shallow Aquifer Heads**: Heads remain relatively unchanged in the shallow aquifer, affecting horizontal gradients.
- **Gradient Variation**: The hydraulic gradient near the well is three times greater than halfway between the well and the contaminant-source.
- **Gradient and Velocity**: RH does not account for the steeper vertical gradient closer to the pumped well or the higher velocity in layer 3 over a 200 ft travel distance.
- **Travel Distance Plausibility**: It's more likely that the travel distance in the shallow aquifer exceeds 800 ft, with a shorter distance in the pumped aquifer, due to the concentration of vertical downward transport and gradients near the pumping well.
- **Downward Flux**: RH's calculations indicate that downward flux is only about 5% of the horizontal flux in the shallow aquifer.
- **Misguided Assumptions**: RH's estimates are based on an overly simplistic and unreliable methodology.

4.9.4 Purpose of ATSDR Modeling

AS claims that the ATSDR models cannot be used for the purpose of estimating Plaintiffs' exposures because that was not the stated purpose of the model (Spiliotopoulos 2024, p. 18). This is a flawed rationale because the stated purpose of a model does not limit or determine the value and use of the model and its results.

ATSDR is a Public Health Agency. Therefore, reports reflect (and state) the ATSDR policy that analyses were not being conducted or extrapolated by ATSDR to individuals. This agency policy is not an indication or determination as to the applicability of the model and historical reconstruction results to individuals.

The methodology used by ATSDR was appropriate and reasonable to provide mean monthly contaminant concentrations in finished water. These model results may be used by health professionals for an epidemiology study and/or to estimate past exposures of residents on an "as likely as not" or "more likely than not" basis. The methods used were rigorous and scientifically sound. ATSDR appropriately told the public that "ATSDR's exposure estimates cannot be used *alone* to determine whether you, or your family, suffered any health effects as a result of past exposure to TCE-contaminated drinking water at USMCB Camp Lejeune." A determination of health effects requires interpretation of the exposure and dose data by a health professional.

5.0 Summary and Conclusions

I have provided detailed responses to eight topical areas addressed in DOJ's Expert Reports (Brigham 2024, Hennet 2024, Spiliotopoulos 2024). None of the opinions found in the DOJ Expert Reports would substantively or even moderately change any of the conclusions from ATSDR's historical reconstruction and water-modeling analyses reported in Maslia et al. (2007, 2013, and other supporting reports and documents), or the opinions in my October 2024 expert report. In summary, in response to DOJ's expert reports, I offer the following opinions and conclusions within reasonable scientific certainty:

- ATSDR calibrated its models using a four-stage, hierarchical calibration process. Results of the model-calibration process indicated excellent model and observed data comparisons in finished water at the WTPs, which resulted in geometric model biases of solely 1.5 (TTWTP) and 2.3 (HPWTP). This provides confidence that model behavior (i.e., results) for all four calibration stages provide reasonable accuracy and concordance with system behavior. Neither RH (2024) nor AS (2024) address the merits of the four-stage calibration process in their reports.

- AS (2024) repeatedly accuses ATSDR of making "arbitrary" assumptions and of not basing parameter values on site-specific data. Neither accusation has merit. For example, AS (2024) takes the position that adjusting a model parameter value (e.g., mass loading) to fit water quality data, which are of course site-specific data, is an "arbitrary" decision. (For example, AS Report, pages 78-79.) This is not true. Making such an adjustment is an accepted and best-practices part of the methodology of model calibration. As another example, AS asserts (at page 84) that the use of a U.S. EPA study (USEPA 1986, 1987) of 12,444 leak incident reports to estimate the timing of UST releases at Hadnot Point is "arbitrary and uncertain." Again, this is not true. Reliance upon such a comprehensive study is an accepted methodology; it is not "arbitrary." In summary, ATSDR based parameter values on the best data it had available, including site-specific and published data. ATSDR also made appropriate adjustments to parameters to fit site-specific conditions.

- It is precisely because there was limited data prior to 1980 that ATSDR applied the historical reconstruction process, which included information gathering, data analyses, and model simulation to reconstruct historical concentrations of finished water delivered to the residents of Camp Lejeune. Models play an important role in providing insight and information when data are missing, insufficient, or unavailable. Historical reconstruction has been utilized since the 1930s, is a widely accepted analysis method, and has been applied to other high-profile public sites (Konikow 1977, Konikow and Thompson 1984, Rogers 1992, NRC, 1996). This method has also been reviewed extensively by Samhel et al. (2010) and others.

- Owing to the four-stage, hierarchical calibration process that ATSDR used in calibrating its models, the presentations in Tarawa Terrace Chapter A (Maslia et al. 2007) and Chapter F (Faye 2008) reports comparing computed and observed PCE concentrations at the TTWTP comprise a major part of TT model calibration. Such comparisons indicate that, regardless of simulated concentrations at individual supply wells, the calibrated Tarawa Terrace MT3DMS model delivered a reasonably accurate total PCE mass to the TTWTP during the 1980's.

- ATSDR applied models that have been tested and verified, and that are available in the public domain, as part of its historical reconstruction process for Camp Lejeune. These models approximate the physics of groundwater flow and chemical transport and are not "professional judgment." Professional judgment and experience were used when selecting values for model parameters, but those values were based on both field and literature sources and were adjusted over reasonable ranges during calibration to best replicate the observed data, which is the generally accepted methodology in the hydrogeology and modeling fields.

- Selecting model parameters based on professional judgment is a normal, standard, and accepted practice. Data are always limited, requiring professional judgment to determine how to handle this paucity of data and how much weight to assign to the limited number of measurements. Groundwater modelers always wish for more data, but the reality is that there is never enough data available to avoid relying on professional judgment.

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Appendix A — Volatilization Issues: Excerpts From the ATSDR Expert Panel Meetings of March 28, 2005 and April 30, 2009

2005-03-28 Panel Meeting Transcript at 55:2-57:14

Panel members Thomas Walski and Peter Pommerenk (AH Environmental consultant) respond to a question from Dr. James Uber to Morris Maslia about whether there are any potential chemical biological processes taking place in the distribution system.

Dr. Thomas Walksi, 55:2-56:1: "To give you a little answer to your question, Jim, on the processes, most of the things that happen to the VOCs in pipes don't really -- I mean, there's not much that can happen to them. I mean, in pipes, the only place where you could have much of a process affecting them is usually in tanks where you have a free water surface and they can volatize. But when Ben and I did the work in Phoenix/Scottsdale, we looked at that, then went back to Henry's Law and looked at stuff like that. And we did -- you know, since you don't really -- it's hard to measure these kind of things, and there's not a lot of literature on Henry's Law in a perfectly still tank. Usually, if it's for stripping towers and stuff like that, you have a lot of literature data.

But going back and trying to reconstruct this, we estimated 97 percent of what went into a tank came out. Very little is really lost through the surface, and that's about the only process that you lose VOCs is through the surface of the tank. So basically, assuming that it's -- what goes in the system goes to the tap is probably, you know, a reasonable assumption if there's not processes occurring. At least, we couldn't figure out any processes that would knock down the concentration significantly."

Dr. Pommerenk, 56:2-57:14: "Yeah. I have some supporting information on that. Because that question was asked by Camp Lejeune to us as their consultants, we looked into literature and tried to come up with a rough estimate of would there be any removal within the treatment plant. And since, you know, we had to review all of the drawings of the existing plants, we knew the surface areas that are available. We made certain assumptions: You know, is the water quiescent in that tank, or, you know, is there any agitation anywhere?
In all the tanks that we looked in -- and some of the tanks are newer. There's more surface area available today than there used to be early in the seventies. But removal due to volatilization was negligible. I mean, it was less than a tenth of percent. The only location where there would be some removal was in the spiractors that were operated in all these Hadnot Point, Holcomb Boulevard, and Tarawa Terrace plants. And even there, there was a certain uncertainty, depending on they had conditions downstream you would get some agitation at the effluent pipe. So although we said it's probably negligible, and I agree with Tom's number here. At 90 percent, what's going in is coming out on the other end."

2009-04-30 Panel Meeting Transcript

Dr. Pommerenk, 178:18-181:19: " . . .there's a big five treatment plant in between, between the groundwater collection system and the distribution system.

It consists -- and correct me if I'm wrong -- of a [ground storage –ed.] tank. I don't remember what the size is, but it's probably a million gallon or larger. The Hadnot Point plant has a pump station that pumps water from that water collection tank into what are called catalytic softening units or [spiractor –ed.] cones to which [lime –ed.] is injected to facilitate softening and it overflows into a central pipe.

It goes from there through a rectangular basin that used to be a re-carbonation base, and I'll get back to that. And from there into gravity filters and you know after chlorination and fluorination into a finished water clear well.

Obviously, in this facility there's several quiescent or not so quiescent surfaces from which volatile –ed.] organic compounds can escape. And that kind of depends on the physical properties of these compounds, PCE more so than TCE and so on. We made an estimate a few years ago, a rough estimate, that probably PCE and TCE, we didn't look at BTEX, removal would be incidental, minor, probably. The tanks are covered so there's no way effluents could stir up things.

However, what was not looked at that was, because of lack of information is the re- carbonation basin. The re-carbonation basin serves to, it's typically a small, flow-though basin to which you inject carbon dioxide that is generated from a propane generator or from gas bottles. And carbon dioxide is an [acid –ed.] in water and [decreases –ed.] the pH which has been pretty high prior to, because of lime addition.

So that's how this whole softening process works. You bring the pH up you're still going to have calcium carbonate. Bring the pH back down within the allowable limits. So as far as I know, and as far as I can recall, I've never seen this basin in operation. It was just water flowing through. However, it was put in for a purpose originally some time in the '40s, and nobody can tell me exactly if it ever has been operated and how long it has been operated. Because if it has been operated, it could have [caused –ed.] substantial removal of PCE and TCE. It would have been in the 90 percent removal.

And it kind of depends on the gas flow rates. It kind of depends on the turbulence that got generated. So there's a variety of factors that would have presented. But it could have affected removal of these compounds in the plant. And again, we just looked at PCE and TCE as from volatilization from the basins that are there, not [re-carbonation –ed.] because we didn't have any additional information.

But it might be worth looking into BTEX volatilization from the basins, you know, whether that as a source is uncertainty again. And I'm not trying to get exact numbers or anything, but it's another source of uncertainty for the exposure calculations for what could potentially be the removal of these compounds from the plant, A. And B, finding out whether this has ever been online, this re-carbonization basin