Exhibit 337

EXPERT REPORT OF STEVEN BIRD, MD
WITH REGARD TO TRACK ONE PLAINTIFF JIMMY LARAMORE

Dated: February 7, 2025
Corrected: June 11, 2025

OUTLINE OF TOPICS

I. **SUMMARY**
II. **QUALIFICATIONS**
III. **MATERIALS REVIEWED**
IV. **HISTORICAL EVIDENCE OF LIFE AT CAMP LEJEUNE RELATED TO SERVICE MEMBERS**
V. **ANALYSIS AND OPINIONS IN THE CASE OF JIMMY LARAMORE**

I. SUMMARY

1. I was asked to review the case of Jimmy Laramore and evaluate the available facts and information regarding Mr. Laramore's exposures to the relevant chemical contaminants in the water at Camp Lejeune during pertinent times. I have authored this Expert Report, in addition to my prior expert reports on general causation regarding bladder cancer and the chemical contaminants at issue, and my supplemental report regarding EPA's recent ban of TCE and PCE. My prior reports are incorporated herein by reference.

2. This report contains, cites to, or will be appropriately accompanied by: (i) a complete statement of all opinions I will express and the basis and reasons for them; (ii) the facts or data considered in forming the opinions; (iii) a listing of exhibits used to summarize or support the opinions; (iv) my qualifications and a list of all publications authored in the previous 10 years; (v) a list of all other cases in which, during the previous four years, I have testified as an expert at trial or by deposition; and (vi) a statement of the compensation to be paid for my work in this case.

3. Mr. Laramore was diagnosed with bladder cancer. It is my opinion that, based on a review of his exposure history and circumstances at Camp Lejeune, Mr. Laramore's exposures to the chemical contaminants in the water at Camp Lejeune were above *de minimis* levels and were significant and substantial, including when compared to exposures discussed in one or more relevant scientific studies as cited previously in my general causation reports.[1]

4. The methodology and basis for the opinions as stated herein are not novel and, for the reasons set forth, are generally accepted in the medical and scientific community.

II. QUALIFICATIONS

5. A copy of my Curriculum Vitae, was provided with my prior expert reports in this matter, as was information including i) my qualifications and a list of all publications authored in the previous 10 years; ii) a list of all other cases in which, during the previous four years, I have testified as an expert at trial or by deposition; and iii) a statement of the compensation to be paid to myself for my work in this case.

6. I earned my Bachelor of Science degree in biology *cum laude* in 1991 from Yale University, where I was named a Yale University Richter Fellow. I worked in the laboratory of Professor Sidney Altman, Dean of Yale College and winner of the 1989 Nobel Prize in Chemistry. I was awarded my Doctor of Medicine degree by Northwestern University in 1995 and was also elected to the Alpha Omega Alpha national medical honor society (generally awarded to the top 10% of medical students nationally). Following medical school, I gained post-graduate training through residencies with the Naval Hospital San Diego (surgery) and the

[1] My understanding is that one or more other properly qualified medical experts are concurrently providing reports and expert opinions to the effect that, based on a review of Mr. Laramore's personal medical history and other factors, Mr. Laramore's chemical exposures at Camp Lejeune were as likely as not substantial factors in causing his bladder cancer. I have not sought to review Mr. Laramore's medical records.

University of Massachusetts Medical School (emergency medicine). In addition, I completed a two-year fellowship in medical toxicology at the University of Massachusetts Medical School in 2004.

7. I began my independent clinical career in the Department of Emergency Medicine at the University of Massachusetts Medical School in 2002. I was promoted to Assistant Professor of Emergency Medicine in 2004, to Associate Professor in 2010, and to full Professor in 2016. In addition, I served as Program Director of the Emergency Medicine Residency Program and as Vice Chair of Education for the Department of Emergency Medicine at the University of Massachusetts Medical School from 2011 to 2019. I am currently the Division Chief of Medical Toxicology at the UMass Chan Medical School and UMass Memorial Health. I work as an Attending Emergency Physician at UMass Memorial Medical Center and Clinton Hospital. I am actively involved with numerous professional committees within the UMass Chan Medical School and its Department of Emergency Medicine and Division of Medical Toxicology and in national and international scientific organizations, such as the Society for Academic Emergency Medicine, the American College of Medical Toxicology and the American College of Emergency Physicians. I served on the Board of Directors of the Society for Academic Emergency Medicine from 2014-2020 and was President of the Society from 2018-2019. Additionally, I was formerly President of the Medical Staff of UMass Memorial Healthcare.

8. During my professional career, I have received several awards, including the Navy and Marine Corp Achievement Medal; the Outstanding Contribution to Medical Toxicology Research by the American College of Medical Toxicology; the Society for Academic Emergency Medicine ("SAEM") Best Resident Basic Science Presentation Award; the SAEM New England Regional Research Directors Excellence in Research Award; the teaching award (twice) from the UMass Emergency Medicine Residency; and a Young Investigator Award from the Society for Academic Emergency Medicine.

9. I am a reviewer for several scientific journals, including the Journal of Medical Toxicology; Clinical Toxicology; Annals of Emergency Medicine; Academic Emergency Medicine; Toxicology; the New England Journal of Medicine; and JAMA. I currently serve on the Editorial Board of Academic Emergency Medicine and was a founding editorial board member of the Journal of Medical Toxicology. I am certified by the American Board of Emergency Medicine and the American Board of Medical Toxicology. I currently hold a license to practice medicine in Massachusetts. In my practice of emergency medicine and medical toxicology, I evaluate people exposed or potentially exposed to a variety of substances on a daily basis. In my review of this case, I utilized scientifically valid and reliable methods to perform my research, followed by a differential etiology methodology and consideration of the weight of the evidence and the Bradford-Hill viewpoints.

III. MATERIALS REVIEWED

10. I have been provided with the following case-specific materials, which I have reviewed and have relied upon in formulating my opinions in this case, all of which will be itemized in more detail in the reliance list forthcoming for this report:

a. Plaintiff's available deposition and declaration testimony;
b. Plaintiff's Exposure Profile document;
c. Information regarding the relevant chemicals, applicable toxicological, medical and epidemiological science;
d. Information regarding ATSDR estimated historically reconstructed water concentrations for relevant chemicals in the Camp Lejeune water;
e. Expert Report of Morris Maslia;
f. Expert Report of Dr. Kelly Reynolds;
g. Expert reports of Kyle Longley; and
h. Materials as were previously listed in connection with my prior general causation reports, submitted in this matter.

11. In addition to the materials provided, I have also reviewed and relied upon the studies and literature cited in this report, all of which are based on scientifically valid principles or are the types of materials I and other physicians and scientific and medical experts normally rely upon to make our opinions in formulating my opinions in this case.

IV. HISTORICAL EVIDENCE OF LIFE AT CAMP LEJEUNE RELATED TO SERVICE MEMBERS

12. In forming my opinions in this case, I have reviewed the expert report and documents cited by Dr. Kyle Longley regarding Camp Lejeune policies and procedures as well as practices and empirical facts of life at Camp Lejeune which would directly affect the absorption of the water contaminants during the pertinent times generally.

13. With regard to the topic of absorption by ingestion, I note that according to historical materials produced in the case and ATSDR publications, the finished potable water used by Marines and others in a variety of manners and contexts would obviously lead to ingestion. Dr. Longley noted general historical observations relevant to the likelihood of increased ingestion of contaminated water at Camp Lejeune:

a. The Hadnot Point water distribution system served as the "nervous center" of the base, meaning that any persons visiting, working, or residing across the base, regardless of whether they lived at Hadnot Point, likely had numerous opportunities to ingest contaminated water, whether through recreational, training, or work activities;
b. The military aimed "to keep the Marines on base" and encouraged the use of the base as an all-inclusive, self-sustaining city/county providing all basic needs to include hospital services, schools, restaurants, gyms, theaters, entertainment, shopping, clubs, sporting competitions, etc., thereby increasing the likelihood of Camp Lejeune inhabitants' frequent and continuous water ingestion from within the Camp Lejeune water treatment systems;
c. Mess halls and restaurants pulled drinking and mixing water from contaminated water sources, including water used during meal preparation and cooking;

d. While today people rely on bottled water, from the 1950s through the 1980s, people drank tap water from the faucet, using the water to create teas, coffee, or powder drinks such as Kool-Aid.
e. Canteens, water fountains, and water buffalos on base were typically sourced from contaminated water sources;
f. The hot climate of the North Carolina coastline (highs in the 80s and 90s for five months) increased water consumption;
g. Strenuous military training regimens and directives to enlisted persons to stay fit and hydrated in accordance with hydration guidelines increased water consumption.
h. Even when military training took place in the field, contaminated water was typically used as the water source for drinking, meal prep, and cooking through the use of water buffalos primarily filled at Hadnot Point locations.

14. Based upon a review of historical and ATSDR publications, residents, workers, and civilians at Camp Lejeune had numerous opportunities to routinely and to continuously ingest significant amounts of contaminated water on base.

15. In addition, I note that according to historical materials produced in the case and ATSDR publications, the finished potable water used by Marines and others in a variety of manners and contexts would obviously lead to inhalation of the water contaminants.

16. Dr. Longley noted the following historical observations relevant to the likelihood of increased inhalation of contaminated water for a military servicemember at Camp Lejeune:

a. Inhalation exposures through barracks housing.
i. Water utilization in barracks housing was determined to be significant, with an average of 862,000 gallons of water per day in those bachelor housing units that drew water from the Hadnot Point water supply. According to the report, within these barracks in the Hadnot Point area, shower flow rates were 4.5 gallons per minute, toilet flow rates were 4.5 gallons per flush, and faucet flow rates were 3.5 gallons per minute. Water vapors occur with showering, flushing, the use of sinks for hygiene, cleaning with water, and other water uses within the barracks.
ii. Historical documents denote a myriad of deficiencies within barracks' housing and other facilities. These included a high rate of faulty or inoperable exhaust fans, lack of vapor barriers allowing for vapor intrusion, standing water on the floor, condensation on windows indicating elevated interior humidity, and mildew presence indicative of excessive moisture in the air. Each of these deficiencies has the capability of significantly increasing an individual's inhalation exposure to the water contaminants.
iii. A 1981 "Report on Study Concerning Mildew and Excessive Moisture in Various Buildings at the Marine Corps Base, Camp Lejeune" notes that some of the air conditioning units in some barracks were having a reverse effect and acting as humidifiers because of clogged fan coil units. It also

notes that "hot moist air [would] enter the sleeping rooms" in some barracks from the laundry rooms and the bathrooms. Some barracks even had condensation on the walls of the sleeping rooms.

iv. A "Final Report on High Humidity/Moisture Conditions Miscellaneous Buildings Camp Lejeune, North Carolina" from 1983 entails that its stated purpose is to show the pervading problem of humidity and moisture across the base. It specifically makes mention of several barracks. Some of the issues include property damage from mold and mildew and "[a]n inordinately high number" of nonfunctioning exhaust fans in the bathrooms. This latter issue led the report authors to conclude that an "insufficient regimen of preventive and general maintenance is occurring."

v. Additionally, even when the barracks had functioning air conditioning units, the military would, at times, not turn on the air conditioning units in an effort to curb energy use. According to a 1982 Utilities and Management Plan, the AC could only run when temperatures exceeded 85 degrees Fahrenheit.

b. Inhalation exposures at mess halls.

i. The amount of water used daily within the mess halls was significant. The Marine Corps estimated that the mess halls utilized 116,000 gallons of water per day. Contemporaneous reports and requests from the U.S. Marine Corps acknowledge the inadequate ventilation of steam within the mess halls. Historical documents show the lack of ventilation hoods on the dishwashers within mess halls until approximately 1986 or 1987. Dr. Longley noted HVAC issues and poor ventilation in the mess hall, which would provide a setting to increase the quantity of inhalation exposure. Settings in which there was VOC inhalation exposure included but were not limited to:

1. Eating in mess halls where steam tables with pans of hot water were used to keep food warm;
2. Cooking with water in mess hall kitchens; and
3. Using large dishwashers in mess hall kitchens.

c. Inhalation exposures throughout military duties

i. Settings in which there was VOC inhalation exposure that existed in the course and scope of military duties included but were not limited to:

1. Basewide high-pressure steam cleaning of all vehicles with steam from a portable steam jenny mixed with water to remove accumulations of oils, grease, and dirt;
2. Water training from contaminated sources, including swimming and training in a pool natatorium;
3. Laundry with and without the use of steam jennys;
4. Water use and consumption during field training; and
5. Water consumption within tent cities (showering, cooking, meal prep).

17. According to Dr. Longley's research, the military estimated that soldiers could use 0.2 gallons of water a day for teeth brushing, 0.25 gallons per day for shaving, 0.75 gallons of water for washing hands, and 1.7 gallons total for personal hygiene. Water requirements for sanitization of meal preparation and serving equipment were estimated at 0.75 gallons per soldier per meal.

18. Finally, with regard to the exposure pathway of dermal absorption, I note that, according to historical materials produced in the case and ATSDR publications, the finished potable water used by Marines and others in a variety of manners and contexts would lead to obvious dermal exposure, as a VOC mass is absorbed through the skin into the bloodstream from a contacting medium, such as water and water vapor.

19. Dermal exposure opportunities, as identified when discussing inhalation above, include showering, bathing, general hygiene, cooking, laundering, cleaning, training activities using or within contaminated water, recreational swimming, recreational use of water, and other activities where the contacting medium containing a VOC concentration contacts the skin surface.

20. Studies have shown that damaged skin, a frequent hallmark of Marine training and life at Camp Lejeune according to Dr. Longley's research, exhibits increased absorption rates for both hydrophilic and lipophilic compounds. [Chiang A. J Appl Toxicol 2012;32:537-63; Nielsen JB. Arch Derm Res 2007;299:423-31; Tsai JC. J Pharm Sci 2001;90:1242-54] Additionally, skin conditions such as eczema can lead to a marked increase in the absorption of solvents such as toluene and xylene .[Hino R. Contact Dermatitis. 2008;58:76-9].

21. The end result of the above descriptions of the routes of exposure to TCE, PCE, benzene, and vinyl chloride via ingestion, inhalation, and/or dermal is that persons present on the base during the contamination periods had the opportunity for significant exposure to and absorption of contaminants contained in water and vapor through their routine habits including but not limited to showering/bathing, cooking, eating, military duties and training, working, civilian and recreational activities, and sleeping in their homes and quarters.

V. ANALYSIS AND OPINIONS IN THE CASE OF JIMMY LARAMORE.

22. Based upon the documents and information provided, I note the following exposure history:

23. According to his Exposure Profile and other information as per the reliance list to be forthcoming, Jimmy Laramore was born on [redacted], 1959. He was 6'5" and weighed approximately 230 pounds when he was at Camp Lejeune. He served in the 2nd Battalion, 10th Marines, 2nd Marine Division.

24. The available information indicates that Mr. Laramore primarily resided and worked at Hadnot Point throughout the dates of December 10, 1983, to December 17, 1984. Absent evidence that he left the base or the pertinent areas such as Hadnot Point that were contaminated during that period of time, Mr. Laramore was exposed to contaminated water for approximately **374 days** during this time period of 1983-84.

25. I have reviewed ATSDR historical reconstruction modeling estimating certain monthly average contaminant levels in the water distributions systems affecting the Plaintiff including Hadnot Point. In that regard, below is a cropped excerpt from the ATSDR report entitled, Analyses and Historical Reconstruction of Groundwater Flow, Contaminant Fate and Transport, and Distribution of Drinking Water Within the Service Areas of the Hadnot Point and Holcomb Boulevard Water Treatment Plants and Vicinities, U.S. Marine Corps Base Camp Lejeune, North Carolina, Chapter A: Summary and Findings (March 2013):[2]

Appendix A7. Reconstructed (simulated) monthly mean concentrations in finished water for tetrachloroethylene (PCE), trichloroethylene (TCE), *trans*-1,2-dichloroethylene (1,2-tDCE), and vinyl chloride (VC) at the Hadnot Point water treatment plant, Hadnot Point–Holcomb Boulevard study area, U.S. Marine Corps Base Camp Lejeune, North Carolina, January 1942–June 2008.—Continued

[Concentrations in finished water computed using mixing-model approach; —, water treatment plant not operating; *, model simulations not conducted]

Stress period	Month and year	Concentrations in finished water, in micrograms per liter				
		Tetrachloroethylene (PCE)	Trichloroethylene (TCE)	*Trans*-1,2-dichloroethylene (1,2,-tDCE)	Vinyl chloride (VC)	Benzene
501	Sept. 1983	26	543	292	45	9
502	Oct. 1983	5	134	61	9	10
503	Nov. 1983	39	783	435	67	10
504	Dec. 1983	34	688	381	59	9
505	Jan. 1984	21	427	233	36	11
506	Feb. 1984	27	560	303	47	8
507	Mar. 1984	28	587	320	50	7
508	Apr. 1984	18	400	206	33	12
509	May 1984	23	491	262	42	10
510	June 1984	22	471	256	41	7
511	July 1984	24	507	278	45	7
512	Aug. 1984	26	539	295	48	8
513	Sept. 1984	21	443	241	39	8
514	Oct. 1984	3	94	40	6	8
515	Nov. 1984	31	639	358	59	8
516	Dec. 1984	2	43	26	4	2

26. I have further reviewed the exposure assessment of Plaintiff as prepared by Dr. Kelly Reynolds as part of her expert report which includes the following information on levels of contaminant exposures:

Exposure Dates	Total Days	Exposure Location (Work)	TCE (ug/l-M)	PCE (ug/l-M)	VC (ug/l-M)	BZ (ug/l-M)
12/10/1983-12/31/1983	22	Hadnot Point	688	34	59	9
1/1/1984-1/31/1984	31	Hadnot Point	427	21	36	11
2/1/1984-2/29/1984	29	Hadnot Point	560	27	47	8

[2] https://www.atsdr.cdc.gov/camp-lejeune/media/pdfs/2024/10/chapter_A_hadnotpoint_1.pdf

3/1/1984-3/31/1984		31	Hadnot Point	587	28	50	7
4/1/1984-4/30/1984		30	Hadnot Point	400	18	33	12
5/1/1984-5/31/1984		31	Hadnot Point	491	23	42	10
6/1/1984-6/30/1984		30	Hadnot Point	471	22	41	7
7/1/1984-7/31/1984		31	Hadnot Point	507	24	45	7
8/1/1984-8/31/1984		31	Hadnot Point	539	26	48	8
9/1/1984-9/30/1984		30	Hadnot Point	443	21	39	8
10/1/1984-10/31/1984		31	Hadnot Point	94	3	6	8
11/1/1984-11/30/1984		30	Hadnot Point	639	31	59	8
12/1/1984-12/17/1984		17	Hadnot Point	43	2	4	2
		374		**5,889**	**280**	**509**	**105**

27. Using this exposure assessment, Mr. Laramore met or exceeded the levels that I discussed in my prior report on general causation as being hazardous to human health and generally capable of causing cancer, including bladder cancer, in exposed individuals. See in this regard my prior expert report and its citations to publications, including but not limited to Aschengrau 1993, ATSDR 2018, and Bove 2024b.

28. Subject to the qualifications included in my general causation report for bladder cancer, below are the amounts of the Camp Lejeune water contaminants that have been shown to cause bladder cancer. It is my opinion to a reasonable degree of medical, scientific, and toxicological certainty that any individual with exposure to any one of these chemicals at the level (or higher than the levels) identified below, as likely as not, were at an increased risk of bladder cancer. The exposure quantities, to reiterate, should not be interpreted as floors below which cancer does not occur:

a. **Cumulative exposure to 27-44 mg of PCE**: 1. Aschengrau A, Ozonoff D, Paulu C, et al. Cancer risk and tetrachloroethylene-contaminated drinking water in Massachusetts. *Arch Environ Health*. 1993;48(5):284-292.

b. **Cumulative exposure to less than 110 ppb-months of TCE**: Agency for Toxic Substances and Disease Registry (ATSDR). *Morbidity Study of Former Marines, Employees, and Dependents Potentially Exposed to Contaminated Drinking Water at U.S. Marine Corps Base Camp Lejeune*. April 2018.

c. **Cumulative exposure to less than 36 ppb-months of PCE**: ATSDR, 2018.

d. **Cumulative exposure to 110 – 11,030 ppb-months of TCE**: ATSDR, 2018.

e. **Cumulative exposure to 36 - 711 ppb-months of PCE**: ATSDR, 2018.

f. **Cumulative exposure greater than 11,030 ppb-months of TCE**: ATSDR, 2018.

g. **Cumulative exposure greater than 711 ppb-months of PCE**: ATSDR, 2018.

h. **1098 ppb-months of TCE: Bove FJ. Cancer Incidence among Marines and Navy Personnel and Civilian Workers Exposed to Industrial Solvents in Drinking Water at US Marine Corps Base Camp Lejeune: A Cohort Study. Environ Health Perspect 2024b;132;10.**

i. **45 ppb-months of PCE: Bove 2024b Cancer Incidence Study**

j. **15 ppb-months of benzene: Bove 2024b Cancer Incidence Study**

k. **66 ppb-months of vinyl chloride: Bove 2024b Cancer Incidence Study**

l. **285 ppb-months of TVOC (Tarawa Terrace) or 1,224 ppb-months of TVOC (Hadnot Point): Bove 2024b Cancer Incidence Study**

29. Additionally, Dr. Reynolds estimated Mr. Laramore's cumulative ingestion as follows:

		Chart 1: 1L	Chart 2: ATSDR marine in training (4.334 L consumption per day)	Chart 3: Deposition informed ingestion activities	Chart 4 Deposition/FM
	Cumulative ug/l-M	Cumulative consumption (total ug= days*concentration per L)	Cumulative consumption (total ug= days*concentration per ATSDR exposure assumptions)	Cumulative consumption (total ug= days*concentration per deposition exposure assumptions)	Cumulative consumption (total ug= days*concentration per deposition/FM exposure assumptions)
TCE	5,889	172,692	748,447	612,853	1,144,208
PCE	280	8,200	35,539	29,100	54,331
VC	509	14,926	64,689	52,970	98,895
BZ	105	3,095	13,414	10,984	20,507

30. Notably, Dr. Reynolds calculated an estimated mass ingestion dose of PCE delivered to Mr. Laramore at Camp Lejeune ranging from **29.2 mg to 54.5 mg.**

31. Mr. Laramore's range of exposure to PCE corresponds to the 90th percentile exposure group in Dr. Aschengrau's Cape Cod PCE-contaminated water epidemiology study which showed a 303% increase[3] for the development of bladder cancer and was adjusted for confounding factors such as smoking and family history. Of note, the cumulative delivered dose in the Cape Cod study was computed in terms of mass of PCE that entered a given house as a solute in drinking water over a specific amount of time. The water modeling did not attempt to compute the actual delivered dose of PCE received by the individuals under the study. For this reason, the estimated dose to any household member was estimated to be less than the cumulative amount of contaminants delivered to the household. Therefore, any individual household member in the 90th percentile of dose was likely receiving less than 27,100 to 44,100 µg, respectively.

32. Further, in the Aschengrau study, actual water sampling obtained from each town showed the following measurements and means of PCE, which are comparable to that in the Camp Lejeune cohort:

	Mean	**Lowest measured**	**Highest measured**	**75th Percentile**
Barnstable	**ND**	**ND**	**ND**	**ND**
Bourne	**57 µg/L**	**ND**	**540 µg/L**	**26 µg/L**
Falmouth	**47 µg/L**	**ND**	**75 µg/L**	**62 µg/L**
Sandwich	**36 µg/L**	**ND**	**92 µg/L**	**59 µg/L**
Mashpee	*Not sampled*	*Not sampled*	*Not sampled*	*Not sampled*

33. When comparing Mr. Laramore's PCE levels to the Aschengrau study, he was exposed to an amount of exposure that is considered substantial since it is known to be hazardous to human health. This only addresses the chemical in isolation and does not consider the additive (and perhaps synergistic) effect of combining ingestion of TCE, PCE, VC, and benzene. As I stated in my general causation report, while it is frequently assumed that the toxic effects of solvents are additive, the chemicals may also interact synergistically or antagonistically." [Bruckner JV. Toxic effects of solvents and vapors. In Casarett and Doull's Toxicology: The Basic Science of Poisons, 9th Ed., Chapter 24 (Toxic Effects of Solvents and Vapors), p. 2 of 157

34. Further, when absorbed VOCs from inhalation and dermal exposures are considered (see below), Mr. Laramore met or exceeded other absorption levels that were discussed in my prior report on general causation as being hazardous to human health and generally capable of causing cancer, including bladder cancer in exposed individuals.

[3] Bladder Cancer. 39% increased risk of bladder cancer that was dose-related with 303% increase among 90th percentile of exposure; Adjusted relative risks among ever exposed subjects: 1.39 (95% cl=.067-2.91); Adjusted relative risks among 90th percentile of exposure: 4.03 (95% CL = .65-25.10) (303% increase).

35. Based on the above, as well as the totality of my prior reports and reviewed materials, it is my opinion, to a reasonable degree of medical, scientific, and toxicological certainty, that Mr. Laramore was exposed to the relevant chemicals at Camp Lejeune at levels individually or collectively known to be hazardous to human health, that were capable of causing humans to develop cancer in general and bladder cancer in particular, and that placed Plaintiff Jimmy Laramore at an increased risk of developing bladder cancer.

36. When determining whether a person's exposure to a toxic chemical, mixture, or stew of such chemicals is substantial versus *de minimis* in nature, it is important to consider the amount of the exposure, the duration of the exposure, the frequency of the exposure, and the intensity of the exposure. Here, a review of the available facts and information concerning Mr. Laramore's ingestion, inhalation, and dermal exposure to the contaminated water at Camp Lejeune reflects that it constituted a substantial exposure capable of causing bladder cancer consistent with my analysis and conclusions in the general causation report.

37. As additional biographical information, according to Mr. Laramore's deposition and declaration testimony, on a typical day at Camp Lejeune, he would wake up at 4:30 or 5:00 am and have physical training ("PT"). Laramore Dep. 61:4-8. Physical training usually consisted of exercises out in front of the barracks, followed by a three-mile run. *Id*. 63:23-64:3. It would typically take about an hour each morning. Laramore Declaration para. 14.

38. Mr. Laramore testified that he drank "a pretty good bit" of water. Laramore Dep. 67:5. He drank from an approximately 32 oz cup that he would fill at the water fountains or restroom faucets. *Id*. 67:18-24. He would drink at least one cup in the morning, another cup during the day, and a little less than a full cup at night. *Id*. 68:1-22. Additionally, he would periodically drink 12 ounces of water with his meals at the chow hall; he otherwise drank milk or coffee. *Id*. 69:13-70:5.

39. I have considered and analyzed qualitative and quantitative factors, including a mass ingestion dose, contributing to Mr. Laramore's ingestion exposure at Camp Lejeune. I opine that Mr. Laramore was exposed to substantial levels of PCE, TCE, VC and benzene via his ingestion of toxic chemicals at Camp Lejeune.

40. In addition to ingestion exposure, Mr. Laramore also would have had inhalation and dermal exposures to the water contaminants. For example, after PT, Mr. Laramore would take a shower in his barracks; the shower would take between 15-30 minutes. Deposition 63:3-5; 61:16-19. Laramore Declaration para. 6. He also spent about five minutes on his personal hygiene routine after his shower. Laramore Declaration para. 6.

41. After showering, Mr. Laramore would eat breakfast in the chow hall. Laramore Dep. 63:6-8. After eating breakfast, he would begin work at the armory shortly before 7am. *Id*. 63:9-15. Mr. Laramore would eat lunch at the chow hall between 12:00pm and 1:00pm before going back to work at the armory. *Id*. 64:12-17. He would stop working around 5pm and eat dinner at the chow hall around 5:30pm. *Id*. 64: 18-65:4. He ate all three meals at the same chow hall. *Id*. 64:7-65:2. He spent about 30 minutes eating each meal. Laramore Declaration para. 10.

42. After dinner, Mr. Laramore would take a second shower before retiring for the day. Laramore Dep. 65: 6-8. His second shower was longer, usually about 30-45 minutes. *Id*. 65:15-17.

43. He did his own laundry in the barracks and also cleaned the barracks for about an hour every day which involved water-based cleaning such as mopping and cleaning the toilets. Laramore Declaration para. 8-9.

44. He recalls going to the dentist on base and had a vehicle that he likely washed on base. Laramore Declaration para. 12-13.

45. While stationed at Camp Lejeune, Mr. Laramore would leave the base for short periods to go shopping or go out to eat. Laramore Dep. 70:23-25. He only left the base for a few hours at a time and does not recall leaving for an entire weekend. *Id*. 71:1-7.

46. Relevant to his dermal exposure, Mr. Laramore testified that he is prone to bug bites. Laramore Declaration para. 11.

47. Mr. Laramore was exposed to inhalation of VOCs throughout the day in a variety of settings. While it is difficult to quantify all these inhalation exposures, the dose from inhalation routes is - as likely as not - comparable or greater than the dose from the ingestion route. For example, an internal dose via inhalation of TCE during a 10-minute shower is comparable to an internal dose via the ingestion of two liters of TCE-contaminated drinking water.[4] Andelman has estimated that the daily indoor inhalation exposure associated with contaminants originating in tap water may be as much as six times higher than ingestion exposure" [*Journal of the Air and Waste Management Association*, Volume 46, pages 830-837, 1996]. An article by Giardino and Wireman stated that "many scientists have shown that inhaling volatile organic chemicals (VOCs), such as benzene-contaminated water during showering, results in larger lifetime exposures than ingesting or dermally absorbing the VOCs from similarly contaminated water" [*Journal of Hazardous Materials*, Volume 62, pages 35-40, 1998]. McKone conducted a detailed analysis of household exposure to VOCs due to contaminated tap water and concluded that "indoor inhalation exposures attributable to a contaminated tap water can be between 1.5 and 6.0 … times the exposure attributable to the consumption of 2 L/day tap water by a 70-kg adult" [*Environmental Science and Technology*, Volume 21, pages 1194-1201, 1987]. In fact, the ATSDR also concluded the dose from the inhalation and dermal routes may be as high as the dose from the ingestion route.[5]

48. A Marine in training, such as Mr. Laramore, under warm weather conditions could drink between one and two quarts of water per hour. ATSDR 2014. Combining this ingestion rate with dermal and inhalation exposures from showering twice a day, Mr. Laramore could consume a liter equivalent of up to eight liters of drinking water per day. The Hadnot Point distribution system had a median TCE monthly average level of **453 ug/L** during Mr. Laramore's time at Camp Lejeune, which resulted in a possible daily exposure as high **as 3.6 mg/day**, i.e., within the range of workday exposures that occurred in some occupational settings.

[4] Weisel CP. and Jo WK. Environ Health Perspect 1996;104:48-51
[5] 2014 ATSDR

49. Mr. Laramore would have been exposed to inhalation during a variety of daily activities leading to a substantial inhalation exposure due to the VOCs present at Camp Lejeune

50. The end result of the above descriptions of the routes of exposure to TCE, PCE, benzene, and vinyl chloride via ingestion, inhalation, and/or dermal exposure is that Mr. Laramore was exposed to a substantial amount of known carcinogens at Camp Lejeune through exposure to and absorption of contaminants contained in water through his routine habits, including but not limited to showering/bathing, cooking, eating, military duties and training, working, and recreational activities.

51. Mr. Laramore was exposed to PCE, TCE, VC, and benzene with such daily and/or weekly consistency and intensity, there was likely little to no recovery period from the VOCs in his body throughout his entire duration at Camp Lejeune.

52. For PCE, the ATSDR (2019a) has stated the following: "When tetrachloroethylene is found in water, it can enter your body when you drink or touch the water or when you breathe in steam from the water. Most of the tetrachloroethylene that you breathe in or drink will move from your stomach or lungs into your bloodstream. If you have tetrachloroethylene in your blood, you will breathe most of it out very quickly. A small amount of tetrachloroethylene in your blood may get changed into other chemicals that leave your body in urine. It takes about 3 days for half of the tetrachloroethylene in your body to be eliminated."

53. For TCE, the ATSDR (2019b) has stated the following: "When trichloroethylene is found in water, it can enter your body when you drink or touch the water or when you breathe in steam from the water. Most of the trichloroethylene that you breathe in or drink will move from your stomach or lungs into your bloodstream. Once in your blood, your liver changes much of the trichloroethylene into other chemicals. When the body absorbs more trichloroethylene than it can break down quickly, some of the trichloroethylene or its breakdown products can be stored in body fat for a brief period. However, once absorption ceases, trichloroethylene and its breakdown products quickly leave the fat. You will quickly breathe out much of the trichloroethylene that reaches your bloodstream; most of the trichloroethylene breakdown products leave your body in the urine within a day."

54. For VC, the ATSDR (2006) has stated the following: "Most of the vinyl chloride is gone from your body a day after you breathe or swallow it."

55. For benzene, the ATSDR (2007) has stated the following: "When you are exposed to benzene in food or drink, most of the benzene you take in by mouth passes through the lining of your gastrointestinal tract and enters your bloodstream. Once in the bloodstream, benzene travels throughout your body and can be temporarily stored in the bone marrow and fat. Benzene is converted to products, called metabolites, in the liver and bone marrow. Some of the harmful effects of benzene exposure are caused by these metabolites. Most of the metabolites of benzene leave the body in the urine within 48 hours after exposure."

56. Considering all four VOCs would stay absorbed into the body at a minimum of 24 hours, this duration of exposure for the Plaintiff was substantial considering there was never a period of time in which the VOCs and their metabolites would not be coming into contact with his body. The VOCs will be absorbed in the body with the constant daily (perhaps hourly) chronic exposure to the VOCs. Under the circumstances, it was more likely than not that Mr. Laramore was chronically exposed to the VOCs the entire time he was at Camp Lejeune. In Mr. Laramore's case, the duration of exposure would be **374 days** of chronic exposure to the VOCs in his body. This was a substantial duration to be exposed to known carcinogens.

57. In conclusion, my opinion is that Mr. Laramore was exposed to levels of carcinogens that are known to be hazardous to human health, including bladder cancer, and as a result, developed an increased risk of developing bladder cancer. Mr. Laramore was exposed to a substantial amount of contaminants during his time at Camp Lejeune that are carcinogens, and his exposure to the chemical contaminants was at levels that can generally cause cancer, including bladder cancer.

58. Based on the foregoing, and for the reasons stated above, it is my opinion to a reasonable degree of medical, scientific, and toxicological certainty that the exposures to the chemical contaminants that Mr. Laramore had at the base went well above normal background levels of exposure and that such cumulative exposure from the chemicals was at a substantial level that is generally capable of causing the development of cancer and of bladder cancer. These exposures were significant and were not minimal or insignificant.

59. The opinions I have reached are based on my review of the evidence of exposure in this case, the medical and scientific literature cited herein concerning chemical characteristics, science, exposure and disease, available epidemiologic, toxicological and other studies and science, and my knowledge, skill, experience and training as a physician, toxicologist, and expert who has worked with chemical exposures and diseases for many years. All statements made herein are made with a reasonable degree of medical, scientific, and toxicological certainty.

DATED: February 7, 2025
Corrected: June 11, 2025

Steven Bird, M.D.