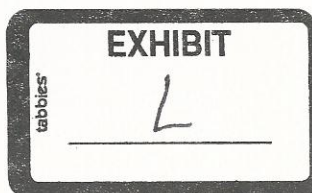


COMMENT BY JOHN B. WELLS

My name is John B, Wells and I am a retired Navy Commander as well as an attorney-at law. I write to comment upon the most recent Department of Veterans Affairs proposed regulations to implement 38 U.S.C. § 1116. I refer to the VA RIN 2900-AM74-Definition of Service in the Republic of Vietnam as announced in VA-2008-VBA-0014-0001.

I entered the Navy in February of 1972 and was commissioned an Ensign in June of 1973. In June of 1974 I completed the Main Propulsion Assistant course and was assigned to the *USS Holder* (DD-819) as Main Propulsion Assistant. Ships of that class served frequently on the gun line off the coast of Vietnam but in its territorial waters. The ship's distilling plant/evaporators (hereinafter distillers) were part of the equipment under my purview. In October of 1976 I transferred to the *USS Coronado*, (LPD 11) also as Main Propulsion Assistant. In the fall of 1977 I was reassigned as Chief Engineer after that Engineer was detached for cause. I guided the ship through a successful Operational Propulsion Plant Examination. Again, the ship's distillers were part of the equipment under my purview. Later I was asked to oversee the preparation of the ship's repair plan for the upcoming shipyard overhaul. While I was onboard, the ship deployed twice to the Mediterranean and once to the Carribean.

After a two year shore assignment, I was assigned to the Surface Warfare Officers School Department Head Course. That course included several months of engineering training as well as combat systems and fundamentals. I was assigned to the *USS Badger* (FF-1071) as Operations Officer. I was also in charge of the ship's shipyard overhaul. When the *Badger's* Chief Engineer was fired, I was assigned to that position. Again, the ship's distillers were part of the equipment under my purview. I guided the ship through a successful Light Off Examination



and Operational Propulsion Plant Examination. In 1982, I was assigned to the *USS Worden*, (CG-18) as Chief Engineer. Again, the ship's distillers were part of the equipment under my purview. The ship made deployments to the Western Pacific, Indian Ocean and the North Arabian Sea.

In late 1984, I was reassigned to the staff of the Commander Naval Surface Reserve Force. My responsibilities included the operation and scheduling for nineteen ships of the Naval Reserve Force. In 1987, I was assigned to the pre-commissioning unit of Battleship *Wisconsin* (BB-64) as main Propulsion Assistant. I served as Acting Chief Engineer for a number of months until the Engineer reported. Again, the ship's distillers were part of the equipment under my purview. I was later reassigned as Executive Officer (second in command) of the *USS Puget Sound* (AD-38). *Puget Sound's* mission was the repair of other ships. The ship deployed to the North Atlantic and Indian Ocean-Persian Gulf while I was on board.

In 1989 I was reassigned as Commanding Officer, Naval Reserve Readiness Center Pittsburgh, PA. At this time I began attending law school during the evening. Part of my responsibilities was the training of over 1000 reservists. We developed many training courses including engineering course to include ship's distillers. I retired from the Navy, as a Commander on 1 August, 1994. I graduated from Duquense Law School with a J.D. approximately 6 weeks prior to my retirement.

I was qualified as a Surface Warfare Officer, Officer of the Deck (underway), Combat Information Center Watch Officer, Command Duty Officer, Tactical Action Officer, Navigator, and Engineering Officer of the Watch. I was also qualified for command at sea. I received a mechanical engineering subspecialty based on significant experience.

While in the Navy, my ships operated with units of the Royal Navy and the Royal Australian Navy. This included NATO exercises, RIMPAC exercises and other multi-national exercised operations and operations throughout the world.

I am familiar with the National Research Centre for Environmental Toxicology and the Queensland Health Services, EXAMINATION OF THE POTENTIAL EXPOSURE OF ROYAL AUSTRALIAN NAVY (RAN) PERSONNEL TO POLYCHLORINATED DIBENZODIOXINS AND POLYCHLORINATED DIBENZOFURANS VIA DRINKING WATER, Brisbane Queensland, Australia (2002). I have talked with the authors of that report via e-mail. My wife, who is a Louisiana notary and paralegal, and also an Australian native, went to Brisbane to interview the authors of the report. A copy of that report is attached as Appendix A to this comment. Additionally, I filed the amicus brief in *Haas v. Nicholson*. I believe that I am qualified to address in some detail, the DVA's position.

As a threshold matter, the vessels of both Australian and American origin should be referred to as "ships" and not "boats." Boats are nicknames for submarines or refer to craft carried on ships. I make this comment because it underscores the lack of nautical knowledge and experience of the authors of the DVA's position.

To answer one of the DVA's first objections to the Australian report, the study was peer-reviewed and published. The report was presented to the 21st International Symposium on Halogenated Environmental Organic Pollutants and POPs in Gueongu Korea on 9-14 September 2001. It was then published in Volume 52 of Organohalogen Compounds (ISBN 0-9703315-7-6) which is published by Dr. Jae Ho Yang, Catholic University of Daegu, Korea. Please see <http://espace.library.uq.edu.au/view/UQ:95837> (last visited June 13, 2008). More importantly,

the study was prepared at the request of and for the Australian Department of Veterans Affairs.

They accepted the results as indicated by their subsequent promulgation of the following Statement of Principles, which is a rough equivalent to the Code of Federal regulations:

(1) *Statement of Principles concerning Malignant Neoplasm of the Lung*, NO. 17 OF 2006 FOR THE PURPOSES OF THE VETERANS' ENTITLEMENT ACT OF 1986 AND THE MILITARY REHABILITATION AND COMPENSATION ACT OF 2004
http://www.dva.gov.au/pensions/SOPs/b004rh_malignant_neoplasm_lung.htm

(2) *Statement of Principles concerning Malignant Neoplasm of the Larynx*, NO. 1 OF 2006 FOR THE PURPOSES OF THE VETERANS' ENTITLEMENT ACT OF 1986 AND THE MILITARY REHABILITATION AND COMPENSATION ACT OF 2004
http://www.dva.gov.au/pensions/SOPs/b013rh_malignant_neoplasm_larynx.htm

The authors have informed me that based on the acceptance and incorporation of the report by the Australian government into their Statements of Principles they saw no reason for further peer review.

I noted no uncertainty regarding the amount of concentration of dioxins in the estuary waters noted in the Australian report (hereinafter RAN report). The study noted that ships in the near shore marine waters collected waters that were contaminated with the runoff from areas sprayed with Agent Orange. RAN Report at 10. The authors later reported to this office that estuary containing the dioxins extended more than three nautical miles from shore. (See Appendix A). This means that the contamination would have extended well past the gun line. The distilling plants aboard the ship, which converted the salt water into potable drinking water, according to the study, actually enhanced the effect of the Agent Orange. RAN Report at 42. The study found that there was an elevation in cancer in veterans of the Royal Australian Navy which was higher than that of the Australian Army and Royal Australian Air Force. RAN Report at 13. The report further found that oral ingestion can cause multi-site cancer in the human body.

RAN Report at 58. The RAN report at page 35 noted significant concentrations at Vung Tau. Anecdotal evidence reports Agent Orange in the waters of the rivers which then empty out into harbors and eventually the estuarine waters. Notably, in the Clean Water Act Congress recognized that pollutants discharged from shore will contaminate the navigable waters, waters of the contiguous zone, and the oceans. 33 U.S.C. § 1251(a)(6). The DVA's comment that the exposure levels were not comparable to the amount of exposure land soldiers received is incorrect. As discussed in the RAN report the distilling process enhanced the effect of the dioxin. Additionally the dioxin was ingested orally through drinking waters, food showers etc. The DVA presents no evidence to show that the concentration of dioxins in the water tanks and piping of the ship was less than found on land. On land, the dioxin, once sprayed, would become embedded in the soil. Since the water systems of the ships would have been thoroughly contaminated, the dioxin would have adhered to piping and continued to be contaminated in an ever increasing amount. The authors confirmed this in their discussions with my office. (See Appendix A). The cumulative effect of the contamination would have resulted in a very high concentration. It would have taken months and perhaps years to completely flush the system once the ship moved away from contaminated waters. The Australian study confirmed the enhancing effects of the shipboard distilling plants. RAN Report at 42. In other words, the effect was even more pronounced than if the veteran had merely ingested Agent Orange by breathing it or by drinking water from a contaminated stream. The authors of the report confirm this position. (See Appendix A).

The DVA report contains the curious comment that one had to assume that the sailors drank only the contaminated water and only for an extended period of time. That is a safe

assumption. All Navy ships, manufacture potable drinking water from sea water. This water is replenished almost daily <http://www.bluewaternavy.org/distillation/Water%20treatment.pdf> at 2-3. (last visited June 7, 2007). These ships did not have the capacity to carry potable water throughout the voyage without replenishment via their distillers. The distillers all work on similar principles to produce water (feed water) for the boilers and potable water for the ship's crew. See, e.g. Main Propulsion Plant DD-445 and 692 Classes and Converted Types, Operation Manual <http://www.hnsa.org/doc/destroyer/steamsec10.htm> (last visited April 4, 2006). Water is injected from the sea and is passed through the distilling condenser and air ejector condenser where it acts as a coolant for the condensers. It is then sent through the vapor feed heater into the first effect chamber and into the second effect chamber where it is changed to water vapor. Vapor then is passed through a drain regulator into a flash chamber and passes through baffles and separators into the distilling condenser where it is condensed into water and pumped to the ship's water distribution system. Sea water not vaporized is pumped over the side by the brine pump. *Id.* This is the same process discussed in the RAN report. It was used by American, British and Australian ships. In fact many Royal Australian Navy ships were retired United States Navy ships or ships of the same class as the American Navy. Those that were not of American design were constructed by the British. They all used the same system. This system was used well into the 1990's. More recently a new system, reverse osmosis, is being adopted, but that did not see service in any ship off the coast of Vietnam during the Vietnam War.

It is obvious that the author of the DVA comment and the "scientists and experts" who supported the positions taken know little about the concepts of nautical engineering or even basic thermodynamics. They obviously know little about shipboard life. Potable water was

manufactured continuously along with “feed” water for the ship’s boilers. It was a constant headache and as a Chief Engineer there were many times that I was given round the clock hourly briefings on the status of water. This was especially true in southern latitudes such as Vietnam since the higher ambient sea water temperatures reduced the efficiency of the distilling process. Water was not only a morale factor, it was a requirement for survival. Nor was there any means to transport large quantities of water outside of the reserve potable water tanks.

The DVA’s interpretation of Congressional intent is also irrational. The interpretation does not comport with national or international law. U.S. Navy ships, like their Australian counterparts, steamed within the territorial waters of Vietnam. Territorial waters were historically defined as

1, the water area comprising both inland waters (rivers, lakes and true bays, etc.) and 2, the waters extending seaward three nautical miles from the coast line, i.e., the line of ordinary low water, (oftime called the 'territorial sea'). Seaward of that three-mile territorial sea lie the high seas.

C. A. B. v. Island Airlines, Inc. 235 F.Supp. 990, 1007 (D.C.Hawaii 1964). A wider area, the contiguous zone, reaches out to twelve miles from the coast. *United States v. Louisiana* 394 U.S. 11, 23 n. 26. (1969). Vietnam claimed a 12 mile territorial sea limit, which defines its sovereignty. <http://www.cia.gov/cia/publications/factbook/fields/2106.html> (Last visited 3 April 2006). That is consistent with the limitations of the United Nations Convention on the Law of the Sea Article 3. Three nautical miles is within the outermost range of the 5” 38 gun mounts of Destroyer type ships used in the Vietnam war. Twelve nautical miles (24,000 yards) is beyond the maximum range of the most commonly used shipboard batteries, the 5”38 or the 5”54 naval gun. <http://www.fas.org/man/dod-101/sys/ship/weaps/guns.htm> last visited June 13, 2008.

Accordingly, ships had to have been within the 12 mile limit, or the territorial waters, whenever conducting gunfire support.

The enabling statute, 38 U.S.C. § 1116(a)(1)(A) recognizes a presumption of service connection when the veteran manifests a disease, including lung cancer, when the person was “a veteran who, during active military, naval, or air service, served in the Republic of Vietnam during the period beginning on January 9, 1962, and ending on May 7, 1975.” The threshold factors are the existence of a prescribed disease and service in Vietnam.

In *Louisiana v. Mississippi*, 202 U.S. 1, 52 (1906), the Supreme Court held that the Mississippi Sound, and by extension the waters surrounding all harbors as inland waters, were under the category of “bays wholly within [the Nation's] territory not exceeding two marine leagues in width at the mouth.” Inland, or internal waters are subject to the complete sovereignty of the nation, as much as if they were a part of its land territory. *United States v. Louisiana, supra*. Thus the presumption should apply to any harbor as well as inland waters. The territorial waters to include the contiguous zone are also under the control of the sovereign nation, although innocent passage may not be denied. *Id.* Subject to the right of innocent passage, the coastal state, in this case Vietnam, has the same sovereignty over its territorial sea as it has with respect to its land territory. *See*, 1958 Territorial Sea Convention Article 1-2; Law of the Seas Convention, Article 2.

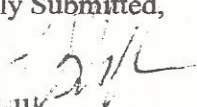
Thus any time a Navy ship was firing its guns ashore, it would have had to have been within the territorial waters of Vietnam. When at anchor in a harbor, it was within the inland waters of Vietnam. At all relevant times, the ship was within the sovereignty of Vietnam and therefore its crew “served in the Republic of Vietnam.” The distance to shore directly

corresponds to the maximum range of the support of forces ashore. Consequently, most naval units often operated close to shore. Gunfire missions were often shot from four or five thousand yards or less, well within the three nautical mile limit. The closer a ship was to shore, the higher the possibility that they steamed through waters contaminated with Agent Orange. In the case of the harbor anchorages, the ships were not only within the sovereign territory of Vietnam, they were within the inland waters. Consequently, under both national and international law, most ships served in the Republic of Vietnam.

The DVA position is irrational, arbitrary and capricious, unsupported by substantial evidence and in contravention of the enabling legislation. Accordingly, the proposed regulations should be rescinded and replaced with a regulation extending the 38 U.S.C. § 116 presumption to servicemembers on ships that served within the 12 mile territorial limit of Vietnam, or certainly, that anchored or operated within any harbor within the territorial limits of Vietnam.

I am available to answer any questions concerning this matter.

Respectfully Submitted,



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APPENDIX A

REPORT ON MEETING BY JANICE WELLS WITH PROFESSOR MICHAEL MOORE AND RESEARCH FELLOW MS. CAROLINE GAUS IN BRISBANE AUSTRALIA ON JULY 3, 2006.

I met with Professor Michael Moore at Queensland Health Scientific Services (QHSS) in July, 2006 to go through the report of the study of the Examination of the Potential Exposure of Royal Australian Navy (RAN) Personnel to Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans via Drinking Water that was issued by QHSS in 2002.

Professor Moore explained that Dr. Keith Horsley, Senior Medical Advisor for The Australian Government, Department of Veteran Affairs (DVA), approached The National Research Centre for Environmental Toxicology (ENTOX) and the Queensland Health Scientific Services (QHSS) and requested that they undertake an Examination of the Potential Exposure of Royal Australian Navy (RAN) Personnel to Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans via Drinking Water. The study was requested by the DAV, following the discovery that statistical evidence showed that the morbidity and cancer levels were far higher in service members of the Royal Australian Navy than those in the Royal Australian Army who had served in Vietnam. Professor Moore explained that this was unexpected by both the Department of Veteran Affairs and the Royal Australian Navy because it was thought that Army service members would be at greater risk because of the type and length of exposure to dioxins. Naval service members deployment was for 6 weeks in the Mekong delta and service members rarely set foot on land while Army service members were exposed during their deployment for an extended period of time in the country of Vietnam. The study was requested to discover the reason. The research took about three years and the report was issued in 2002.

I asked Professor Moore if he had any knowledge of any similar studies in the United States or research in a similar vein and he said he did not. He said he was surprised at that because United States Naval personnel consumed distilled drinking water too and were therefore exposed to the same dioxins. The same morbidity and cancer statistical increases would have been apparent in records of the United States Naval service members as compared to those in the United States Army service members. I asked him if he thought that the statistical increase would be higher given that USN personnel were deployed for longer period's of time than the 6 weeks RAN service members were consuming the distilled drinking water. He advised that it would, but the dioxin exposure was so high in the estimated distilled water consumption in a short period of time, that an increase in time of exposure would make an already extremely high exposure that much worse. Professor Moore commented that the exposure by RAN service members for 14 days was far above World Health Organization acceptable levels, and that 6 months exposure would be off the scale. He advised that Caroline Gaus, who was personally involved in the research, would be available to meet with me, and would be able to take the time to explain dioxin levels and the process of distilling the water on board ship and in the laboratory.

Professor Moore went on to explain while undertaking the research it was found that the only difference between Naval and Army service members was the water they consumed and how it was processed. He said that it was originally thought that because the water was distilled it was pure. Additionally it was thought that because the dioxins were not soluble that they would not be present in the water. However it was found that during distillation of the sediment contaminated water from the estuary, because the dioxins were not soluble, the dioxins would attach to the sediment. Therefore the more particles in the intake water the higher the level of dioxins in the resulting distilled water. It was acceptable practice for the uptake of water to be taken up as close to the shore as possible in the estuary thus reducing the amount of salt, the resulting distilled water would therefore contain more dioxin. Professor Moore noted that the purest water following distillation was used for the boilers and that which contained more sediment (and thus more dioxins), after distillation, would be used for drinking.

Professor Moore also noted that the further out from shore from the mouth of the estuary the less sediment in the water. But as the estuary and the sediment it contained extended more than three nautical miles from shore, it would mean that distillation of water from anywhere in the Mekong delta would result in heavy dioxin levels in the final drinking water. He also advised that Caroline Gaus may have more information on the spread of the sediment pattern from the river, the Mekong delta and the estuary.

I questioned Professor Moore as to what other particles the dioxins would become attached to. Professor Moore communicated that the dioxins would attach to the distilling plant tubing, but would attach also to any food or drinks that used distilled water in its preparation. He particularly mentioned coffee and tea and any food preparation that required the washing of food and cooking of food in water. He said that dioxins would attach to any sediment whether it be soil sediment or food. He suggested that Caroline Gaus would be able to explain the laboratory process of distillation and how the dioxins were deposited on distillation plant tubing and storage tanks which would occur during the distillation process. He went on further to state that the study only took into account the RAN process of distillation on board ship. I informed Professor Moore that the class of ship we were investigating was the same class of ship that was used by the RAN and USN.

When asked about the link of the ingestion of dioxin to cancer Professor Moore commented that as the dioxins attached to fatty tissue in the body they would remain in the body for a long time. He said that cancer caused by the presence of dioxins would not present itself in just a few years but he did think that the presence of dioxins would result in cancer in 15 - 20 years. When asked if he had the mobility statistics for the diagnosis of cancer or death in service member personnel he advised that he did not have them but that the DVA did.

I also met with Ms. Caroline Gaus. Ms. Gaus is a Research Fellow for the National Research Centre for Environmental Toxicology and had been involved in the research and the laboratory distillation tests on this study. Ms. Gaus confirmed the information that Professor Moore had previously given me.

As background Ms. Gaus informed me that inclusion of the dioxins was a malfunction or rather an end result of the manufacturing process for the defoliant but it was not recognized as a problem because the dioxins were not soluble it was thought they would not be in the water. But because by its nature the dioxin attaches to the sediment or other properties - it is a problem. Also Ms. Gaus said that when the defoliant was manufactured it was never anticipated that so much would be used over such large areas for such a long time. Ms. Gaus said that it was not recognized that there was a problem until it was realized that the RAN mobility and cancer statistics were too high and the DVA had to look for a reason.

I asked Ms. Gaus about the sediment in the estuary and how far it spread out to sea. Ms. Gaus confirmed that the sediment extended at least three nautical miles out from shore. She advised that this pattern would be easy to confirm by looking at the satellite pictures for the Mekong delta for the same period of the year as the test period. Ms. Gaus commented that the sediment pattern was easy to see from these pictures and it would be easy to measure the distance the sediment spreads out to sea. Ms. Gaus indicated that Professor Arnold Schecter from the University of Texas, School of Public Health had done a study on humans and had also been to the Mekong delta and estuary and had taken water and sediment samples. Ms. Gaus thought that Professor Schecter may have statistics on the estuary in addition to human mobility statistics.

I questioned Ms. Gaus about which other particles, besides sediment the dioxins would attach to. She explained that the dioxins would attach to the tubing in the distilling plant as well as the storage tanks. But that it was impossible to say how much or for how long it would be there before scale residue would get into future distilled water. She commented that the level of the dioxins would be so high in the processed water that the dioxins that would be deposited on the tubing would only add to an already high level when released from the tubing as scale residue. Ms. Gaus noted that in the laboratory, dioxins did attach to the glass tubing during the distillation process and therefore they did shake the glass components for 7 - 14 days to remove as much of the toxins into the water as possible - but as she said previously - the level of contamination was so high that the extra (even if very little) would just make the level higher. Ms. Gaus noted that tubing used in distillation on a shipboard plant is copper and dioxins would adhere more readily to copper than it would to glass creating a scale like residue that would eventually pass into future distilled water. Again, how long and in what quantity was not possible to determine in the laboratory tests. Ms. Gaus commented that the dioxins would accumulate in tanks as scale like everything else but almost impossible to say how much. But Ms. Gaus reasoned that again the levels were so high during the initial exposure by using the distilled water for drinking and cooking that any future ingestion would have just increased the total level of exposure. Ms. Gaus went further to suggest that the material used for the distillation process would make a difference to the level of dioxins in the final output. However whether it was copper as on board ship or glass as in the laboratory or if the purest form of silver were used for the tubing and the tanks it would still produce distilled water that contained high levels of dioxins. Even the lowest level would still be far too high for consumption.

Ms. Gaus noted that "a key goal of the study was to attempt an evaluation of exposure of RAN

personnel aboard ship on duty in Vietnam by consumption of contaminated water as well as from other potential pathways"¹ Ms. Gaus advised that in the distillation process their recent information suggested that about 5 - 10% of the uptake water was distilled and the rest was discharged into the estuary. That previously it was thought that 50% of the water was distilled that produced the enrichment factor of 2 (i.e. 0.08 - 1.4ng/L) that when 5 - 10% of the water was distilled that the factor increased to approximately 10 - 20. When 50% - 95% of previous distilled water, full of contaminated, was discharged back into the estuary, it is predictable that the uptake water at a later time could have a higher level of contaminants because it had previously been distilled and discharged to mix with the estuary water. So it is possible that distillation again would produce a higher level of dioxins than the original source uptake water from the estuary.

Ms. Gaus noted that it was determined that sailors consumed an average of 5 liters of distilled water per day. That this direct consumption would lead to a daily body burden of about 0.4 - 7 ng/day. The water was also used to prepare food and as a result of the hydrophobic character of the dioxins the TCDD would also accumulate in the food. Hence they estimated that the total exposure due to water contamination food was similar to that of the direct consumption of drinking water - another 0.04 - 7 ng/day. This meant a total of 0.08 - 14 ng/day.

Ms. Gaus noted that it was important to estimate the overall exposure period. She also noted that "According to the reports from RAN personnel the rule on board ship was to produce drinking water primarily during the periods when the ship was in the turbid estuarine water since the water was less pure and could have caused potential damage to the engines if used in boilers. While in the pristine water offshore the distillation units produced water primarily for the ships engine. Hence the drinking water that was produced during the periods in contaminated water lasted for a significant portion of the return trip."² Therefore the ingestion of dioxin contaminated water would continue after the RAN service members left the waters of Vietnam. Ms. Gaus commented that the report estimated that in a 14 day period the total body burden of dioxin through direct consumption of water that originated from distilling in Vietnamese waters are estimated to be between about 10ng to 190 ng. Ms. Gaus advised that as it noted in the report that the "US-EPA have concluded that the dioxin background contamination which is in the range of .05 - 2 pg per kg bw per day at the present may pose a significant cancer risk between 10^{-2} to 10^{-3} ."³ and that the US-EPA recommended guidelines were "2 orders of magnitude lower than the values set by the WHO/ICPS and various European committees."⁴ Ms. Gaus commented that RAN members may have received exposure which is one to two orders of

¹ National Research Centre for Environmental Toxicology report page 33

² National Research Centre for Environmental Toxicology report page 35

³ National Research Centre for Environmental Toxicology report page 36

⁴ National Research Centre for Environmental Toxicology report page 36

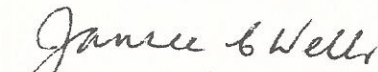
magnitude above the acceptable intake values. Ms. Gaus noted that dioxins attach to fatty tissue in the body after ingestion and would remain present in the body for a long time.

I questioned Ms. Gaus about TCDD and OCDD and she informed me that TCDD and OCDD is produced during the distillation process and TCDD attaches to the sediment and because of low molecular weight and low lipoph stays in the drinking water. Ms. Gaus noted that ODCC was produced also but because of high molecular weight and high lipoph it stays in source water. Therefore when only 10 - 30% of the source water is distilled the OCDD remains in the source water and it is discharged as bilge water into the estuary again.

Both Professor Michael Moore and Research Fellow Ms. Caroline Gaus said that they would be available for telephonic interview at a later date should it be necessary to discuss the study of the Examination of the Potential Exposure of Royal Australian Navy (RAN) Personnel to Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans via Drinking Water that was issued by QHSS in 2002.

Both Ms. Gaus and Dr. Moore were surprised, that the United States Department of Veterans Affairs had not adopted their findings or at least contacted them concerning those findings.

Respectfully Submitted,



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1. "The study was not peer reviewed or published..."

The study was accepted for presentation at the 21st International Symposium on Halogenated Environmental Organic Pollutants and POPs and is published in the associated peer reviewed conference proceedings: Müller, J.F., Gaus, C., Bundred, K., Alberts, V., Moore, M.R., Horsley, K., 2001. Co-distillation of TCDD and other POPs during distillation of water - a potential source for exposure. *Organohalogen Compounds* 52, 243-246.

The results of the study were also accepted for presentation at the IXth International Congress of Toxicology; the abstract is published in: Mueller, J.F., Gaus, C., Bundred, K., Moore, M.R., Horsley, K., 2001. Water volatility of dioxins - exposure through consumption of distilled water. *Toxicology* 164, 157-158.

The study was cited in "*The Third Australian Vietnam Veterans Mortality Study*" published in 2005 by the Department of Veterans' Affairs and Australian Institute of Health and Welfare and resulted in the Department's consideration of Royal Australian Navy Vietnam Veterans as potentially exposed Vietnam Veterans.

2. "...VA's scientific experts have noted many problems with this study that caution against placing significant reliance on the study. In particular, the authors of the Australian study themselves noted that there was substantial uncertainty in their assumptions regarding the concentration of dioxin that may have been present in estuarine waters during the Vietnam War."

The problem referred to in this comment is associated with estimating the exposure level of Vietnam Veterans, not with the study's primary finding that exposure to dioxins was likely if i) drinking water was sourced via distillation and ii) the source water was contaminated.

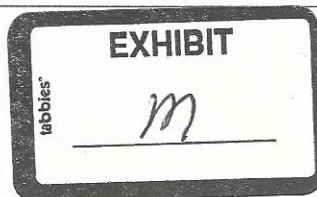
As highlighted by the authors, the exact level of exposure via this pathway is uncertain due to the lack of data on contaminant levels in the source water during the Vietnam War. The attempt made by the study to estimate the level of exposure serves only as an indication that exposure may have been considerable (and depends on the concentrations in the source water).

Hence, the problem lies in the lack of exposure information, not with the study. The study clearly demonstrates that if source water is contaminated, dioxins are expected to co-distil with drinking water.

3. "...VA's scientific experts have noted many problems with this study that caution against placing significant reliance on the study. [...]. Further, although distillation concentrated the dioxin level in the water, the concentrating effect was shown to depend upon the amount of sediment in the water, such that a large sediment levels, consistent with estuarine waters, could significantly reduce the concentrating effect."

This issue is also not related to the study's quality, but rather highlights one of its findings out of context. The study noted that, while increasing suspended sediment loads in the source water decrease the co-distillation of dioxins, dioxins still co-distil with water at the highest level of suspended sediment in the water tested (i.e. at 1.44 g/L 38% of 2,3,7,8-TCDD co-distilled in the first 10% of source water). If 10% of the source water is distilled, TCDD would enrich in the drinking water by a factor of almost 4 compared to the source water. This was confirmed by using water from a tropical estuary with naturally high suspended sediment loading, where 48-60% of TCDD co-distilled with the first 10% of source water.

4. "...VA's scientific experts have noted many problems with this study that caution against placing significant reliance on the study. [...]. Moreover, even with the concentrating effect found in the Australian study, the levels of exposure estimated in this study are not at all comparable to the exposures experienced by veterans who served on land where herbicides were applied. This is true even if we were to assume that a person drank only such distilled water and did so for an extended tour."



As noted above and in the study itself, estimating the level of exposure via this pathway is difficult due to the lack of data on the concentrations of dioxins in the source water. The level of exposure would depend strongly on the dioxin concentrations in the source water (which would have varied from location to location) as well as on the amount and duration of water consumed for drinking and/or cooking.

The study attempted to provide an estimate on the concentrations of dioxins in source water (0.043-0.69 ng/L). While the uncertainty around this value is large (approximately in the order of a factor of 10 or more), it cannot be determined whether it represents an over- or underestimate (which would also depend on location). Hence, it would be difficult to determine whether the level of exposure was similar, higher or lower compared to veterans who served on land. However, the study demonstrates that exposure is likely to have occurred if source water was contaminated and suggests that exposure may have been considerable.

Sincerely,



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