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VA/DOD RESPONSE TO CERTAIN MILITARY EXPOSURES

HEARING

BEFORE THE

COMMITTEE ON VETERANS' AFFAIRS
UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

TOGETHER WITH

ADDITIONAL STATEMENTS SUBMITTED FOR THE RECORD

OCTOBER 8, 2009

Printed for the use of the Committee on Veterans' Affairs

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S. HRG. 111–437

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Available via the World Wide Web: http://www.access.gpo.gov/congress/senate

U.S. GOVERNMENT PRINTING OFFICE

53–367 PDF WASHINGTON : 2010

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VA/DOD RESPONSE TO CERTAIN MILITARY EXPOSURES

THURSDAY, OCTOBER 8, 2009

U.S. SENATE,
COMMITTEE ON VETERANS' AFFAIRS,
Washington, DC.

The Committee met, pursuant to notice, at 9:31 a.m., in room 562, Dirksen Senate Office Building, Hon. Daniel K. Akaka, Chairman of the Committee, presiding.

Present: Senators Akaka, Rockefeller, Brown, Burris, Hagan, Wyden, Burr, and Isakson.

OPENING STATEMENT OF HON. DANIEL K. AKAKA, CHAIRMAN, U.S. SENATOR FROM HAWAII

Senator AKAKA. The Senate Committee on Veterans' Affairs will come to order. Aloha and welcome to today's hearing where we will focus on how the Departments of Veterans Affairs and Defense respond to in-service exposures.

As the Committee charged with oversight of the Department of Veterans Affairs, we must be certain that VA is providing appropriate health care and compensation to those who are harmed by exposures while serving in the military. In order for VA to do that, DOD must first determine who was exposed, what they were exposed to and the health consequences of such exposures. The information must then be shared with VA.

Two of the matters we will look at today relate to claimed exposure of members of the Armed Forces during the current conflicts. The other two involve claimed exposures in the past and relate not only to members of the Armed Forces, but also to family members. These are very different issues and as such, require different approaches.

As to the question of who might have been exposed in the present conflict, current DOD records should be available to answer that question. If they are not, then the Committee must know why not. For the earlier exposures, DOD must pull together records to provide some estimation of potentially exposed populations.

I believe that the overall issue of providing intervention on exposures is vital. DOD should commit to ensuring that going forward no one will leave active duty without a detailed record of where the individual was stationed and a comprehensive physical that might identify any health concerns related to possible in-service exposures.

VA's role is to merge the information regarding potential exposure and the scientific analysis so as to craft an appropriate re-

sponse. This effort must be carried out, giving the benefit of the doubt to the veterans concerned. In some cases, there has been an absence of reliable information on exposures, including health consequences. In other cases, it is not possible to achieve consensus on the science.

One thing is clear, those harmed by an in-service exposure to environmental hazards should receive a timely and appropriate response from the government. Because Congress is not the ideal forum for seeking to resolve complex and often emotional issues related to potential exposures, we must be sure that DOD and VA are working together effectively on such issues.

I look forward to the testimony of the many witnesses that we have here this morning. I now turn to Senator Burr, for his opening statement.

STATEMENT OF HON. RICHARD BURR, RANKING MEMBER, U.S. SENATOR FROM NORTH CAROLINA

Senator BURR. Aloha, Mr. Chairman.

Chairman AKAKA. Aloha.

Senator BURR. And good morning. I want to thank you for calling what I think is an extremely important hearing. I want to welcome our witnesses and to recognize all of the veterans and their family members who have joined us here today for this hearing.

I also want to give a special welcome to two North Carolinians, Jerry Ensminger and Shelly Parulis and to thank them for their tireless leadership and advocacy on behalf of veterans and their families. Your interest in this hearing only serves to underscore the importance of the issues we are discussing today.

Over the years, thousands of military personnel and their families have been exposed to dangerous chemicals where they were living and working while serving our country. Today we will hear about some of those exposures, including: the plumes from an incinerator near a base in Japan; smoke from burn pits being used in Iraq and Afghanistan; dust from a facility in Iraq coated with a known carcinogen; and contaminated drinking water at a base in North Carolina.

I want to express my sincere appreciation to the veterans and family members on our first panel for your willingness to share with us your painful experiences about your exposure. Your perspectives will help guide our efforts to find answers for veterans across the country about how these exposures may have affected their health or the health of their loved ones. More importantly, your testimony will help us determine what steps we need to take to protect and improve the lives of those who have been harmed.

Mr. Chairman, my remarks will focus on one exposure issue that is very personal to me, the contaminated drinking water at Camp Lejeune in my home State of North Carolina. I know we will hear from several witnesses about this issue, but I also would like to acknowledge two former Marines, Jerry Ensminger, who is here today, and David Briscoe, who could not be here today.

They both lived at Camp Lejeune during the years that the water was contaminated and have their own painful stories. David, who lived in Camp Lejeune in the 1980s, was later diagnosed with cancer of the hard pallet and underwent treatment that reduced

his ability to eat, speak and work. Jerry's daughter, who was born at Camp Lejeune in 1975, was diagnosed with leukemia at age six and tragically died 3 years later. Jerry, I commend you for your personal strength in the face of such tragedy and appreciate you being here today.

Unfortunately, Jerry and David's heart-wrenching stories are not unique for veterans who served on Camp Lejeune between 1957 and 1987. The residents of Camp Lejeune didn't know it at the time, but the water they were drinking, cooking with, and bathing in contained harmful chemicals, including TCE, PCEs, benzene and vinyl chloride, which are known or probable human carcinogens.

Some of them are now living with rare cancers, like one of our witnesses today. Mark Partain is a son of a Marine, a former resident of Camp Lejeune, and one of over 20 former Lejeune residents diagnosed with a rare male breast cancer at an unusually young age. He was just 39 years old. This condition usually strikes less than 2,000 men each year and most are over the age of 55.

Although a number of studies have suggested a possible link between the water and Camp Lejeune and these types of conditions, we still do not have the answers about what made Jerry's daughter or Mike or David sick or what has caused our former Lejeune residents to become ill. The government's role in scientific discovery is clear; Camp Lejeune was designed by the EPA as a national priority list site.

Under Title 42 of the U.S. Code, the Agency for Toxic Substance and Disease Registry is conducting a number of studies of the Camp Lejeune contamination. These studies include sophisticated computer modeling and future mortality and health surveys. It is unfortunate that ATSDR was not invited to provide a witness for this hearing so that they could respond to testimony being given by our witnesses and answer questions from this Committee.

Mr. Chairman, I hope in order to strike a balance of the scientific opinion on what I think is an important issue, I would ask that ATSDR's official response to the National Research Council's report on Camp Lejeune be included in the record today.

Chairman AKAKA. It will be included in the record.

[The information referred to appears in the Appendix.]

Senator BURR. I thank the chair for that. We have an obligation to figure out how much of these dangerous chemicals veterans and their families were exposed to at Camp Lejeune and what impact these exposures had potentially on their health. For these patriots who have endured unbearable heartache and suffering, they deserve no less than our best effort to provide them with the answers about why they are sick.

Also, we must always make sure that the claims these families have pending are not prematurely denied by the government before science has had the opportunity to provide more answers. Let me stress, before science has had the opportunity. While we wait for science, we must deal with the fact that many of these exposed veterans and their families continue to suffer from devastating conditions.

It is simply not right for us to continue to tell our veterans and their families to just wait for another study. They have already waited two decades. We owe them much more than that. That is

why I have introduced, along with my colleague from North Carolina, Senator Hagan, legislation—the Caring for Camp Lejeune Veterans Act, S. 1518—which would allow veterans stationed at Camp Lejeune while the water was contaminated to get medical care from the VA.

Perhaps more importantly, it would also allow the VA to treat their families for conditions associated with exposure to contaminated water. Providing health care to veterans and their families would be one step toward meeting our moral obligation to those who have put more at risk. As we will discuss today, there are many other veterans and their families who may have been exposed to dangerous chemicals in other places around the world. For all of them, it is important that we have a framework in place to determine in a fair and hassle free and timely matter what benefits and services they need and deserve.

To that end, we will have a candid and productive discussion today about what is currently working well and where improvements are needed. Mr. Chairman, for veterans and their families put at risk by exposure, whether in Japan, Afghanistan, Iraq or North Carolina, we have a solemn duty to take care of those who were put in harm's way while serving this Nation. I hope we will work together, and I think we will, to provide these veterans and their families with the answers they deserve and more importantly, the help they need.

I thank the chair.

Chairman AKAKA. Thank you very much, Senator Burr. Now we will have the opening statement of Senator Brown.

STATEMENT OF HON. SHERROD BROWN,
U.S. SENATOR FROM OHIO

Senator BROWN. Thank you, Mr. Chairman, Ranking Member Burr, and Senator Hagan, too, for your good work on this very important issue.

Today's hearing is about toxic exposure, elusive science and earned compensation. It is about our servicemembers and their families and how we will resolve the difficult challenges that exposure issues present. When there is doubt, we must take the side of the servicemember.

Yesterday I met with Mary and Jeff Byron. Jeff is a former Marine who served at Camp Lejeune from 1982 to 1985. Mary and Jeff were at Camp Lejeune when their first baby was born and I believe their second child was born. We discussed their family and the impact that living at Camp Lejeune had on this family's lives through that generation and even the next generation.

Jeff is one of more than 5,900 Ohio veterans whose families are part of the Marine Corps Registry for potential exposure at Camp Lejeune. Jeff and Mary are here today. At one point, Jeff, in recalling what had transpired with his family during their time at Camp Lejeune and soon after and the problems that his family was facing, told me he turned to his wife and asked, what is happening to our family?

Connecting the dots between service and exposure is a complicated process. Helping these families should not be complicated. In tough cases like this, we have to ask ourselves, what is the

greater sin? Do we refuse benefits to a servicemember or a veteran or a servicemember's family or a veteran's family who may be suffering from service-connected exposure to cancerous toxins? Or do we provide benefits to a servicemember or veteran or servicemember's family or veteran's family whose health care challenges may not be service-connected?

Do we save a few bucks or do we save a few lives? Scientific certainty should not trump human decency. There is another point here that cannot be overlooked. Our military now is working to connect the dots, but private contractors are not. From the exposures of Camp Lejeune to the burn pits in Iraq, to the emissions at Atsugi Naval Air Station, we found the military working to find the answers.

It has not been the smoothest journey to where we are today. For too long, the Department of Defense fought and denied exposure claims, but the military, again, finally now is working with the VA to serve the best interests of our servicemembers, our veterans and I hope their families.

I spoke this week with the Marine commandant, General James Conway, who has pledged his cooperation and who has pledged that the military will do much better at meeting its obligations than it has in the past. This cooperation though, has not been the case with the sodium dichromate exposure at the Qarmat Ali Water Treatment Plant.

What is the difference? The difference is the water treatment plant was run by a private contractor, KBR. In a recent hearing, soldiers testified they were never offered any kind of protective clothing or masks or other protections by the company. They were never told about the presence of one of the most hazardous carcinogens. Hexavalent chromium is a general toxic carcinogen and inhalation leads to lung cancer, yet the company either dismissed these concerns, or worse, intentionally mislead our military personnel. It is a lousy way to turn a profit.

So, while I am not happy at the speed and the progress of the Department of Defense and the VA, I am outraged at the behavior of private contractors, especially KBR. We should all be outraged by the behavior of KBR and like-minded contractors who take the money from our taxpayers, who take the money from our military, but fail its members. That is not the focal point of this hearing, but it is an issue Congress must confront.

As we consider how to ensure members of our military who have been harmed by environmental hazards benefits they deserve, we should learn from the rocky road former nuclear workers have been forced to travel to prove they have been harmed by their jobs.

The Department of Labor is charged with addressing work-connected health care issues affecting our former nuclear workers, many of whom are in my home State of Ohio. It has been an unjustifiably steep, red-taped-ridden battle for these workers and I welcome my colleagues' assistance and efforts to improve that program. We must not repeat the mistakes of that program as we address the concerns of servicemembers.

We must cut through the bureaucracy and focus on delivering both help and hope to men and women and their families who served our Nation and now are suffering because of it. That is why

the work of this Committee and the leadership of the Chairman and the Ranking Member on this issue are so important. That is why the testimony of our witnesses is so vital and appreciated.

Thank you.

Chairman AKAKA. Thank you very much, Senator Brown. Senator Isakson, your opening statement.

STATEMENT OF HON. JOHNNY ISAKSON, U.S. SENATOR FROM GEORGIA

Senator ISAKSON. Thank you very much, Mr. Chairman. In deference to the witnesses, I will be very brief. I want to thank you at the outset for calling what I consider to be a most important hearing and I look forward to hearing the testimony of each and every witness.

I would like to thank each of the witnesses for helping to shed light on this very serious matter. I would particularly like to thank the witnesses who will be sharing their deeply personal stories. You not only put a face on the consequences of these exposures, but also help us as we determine the correct path for us to follow. I thank you for your service to our country and I thank you for being here today to testify.

Chairman AKAKA. Thank you very much, Senator Isakson. Senator Burris, your opening statement.

STATEMENT OF HON. ROLAND W. BURRIS, U.S. SENATOR FROM ILLINOIS

Senator BURRIS. Thank you, Mr. Chairman. I would like to also thank you for holding this hearing on the important issue of exposure to environmental hazards to our servicemembers. When we ask the brave men and women of this country to risk their lives in service to this country, the country in turn has an obligation to protect them from exposure and environmental hazards and provide information and treatment.

I am deeply concerned whether there have been adequate studies and reporting of environmental hazards in places abroad where we are fighting two wars and in other military bases both abroad and here in the U.S. In addition, as this body debates the reform and expansion of our Nation's health care system and the quality of care that is provided for our citizens, we need to ensure that our soldiers and veterans receive the care that they need from health problems resulting from these exposures.

I want to thank our witnesses today, some of them who have experienced or have loved ones who have experienced severe problems that are caused by some of these hazards. So, I will have a few questions, Mr. Chairman, after we finish our statements. Thank you.

Chairman AKAKA. Thank you very much, Senator Burris. I see my distinguished colleague, who, like our Ranking Member, represents the State of North Carolina. Senator Hagan has joined us. I would like to invite her to share a statement at this time.

STATEMENT OF HON. KAY R. HAGAN,
U.S. SENATOR FROM NORTH CAROLINA

Senator HAGAN. Thank you very much, Mr. Chairman. I would like to begin by thanking you for holding this important hearing and for giving me the courtesy of allowing me to make a brief statement concerning an issue that is so important to me and many of my constituents.

I also want to thank the Ranking Member, Senator Burr, for his leadership on this issue. He has been discussing this issue of water contamination at Camp Lejeune for many years and since I have been sworn in, he and I have worked very closely together on this issue. I have greatly appreciated his guidance and tenacity in pursuing closure for the affected families.

Mr. Chairman, between 1957 and 1987, Marines and their families at Camp Lejeune drank and bathed in water that was contaminated with toxins at concentrations up to 280 times what is currently considered safe by the Environmental Protection Agency. My heart certainly goes out to the Marines and their families who were exposed and affected.

A compelling CNN piece just last month highlighted cases of former Marines and their families who have been diagnosed with male breast cancer. Today there are over 40 individual cases, all of whom at one point or another served on base or lived at Camp Lejeune during the contaminated years. These service men and women, as well as so many, have spent their careers working to successfully finish the mission that they started. I think it should be our mission to get these families complete answers.

Marines and their families who were exposed to dangerous chemicals over several decades deserve to know if this exposure had an effect on their health. They cannot get closure until the remaining CDC studies, which are in progress, are complete; and these CDC studies are to be done by the Agency for Toxic Substances and Disease Registry, the ATSDR. I am looking forward to working with the Navy and the Marine Corps to fully fund these human health and water modeling studies, which will hopefully give us answers. It has received a lot of attention.

I would like to address the conclusion of the National Academy of Science literature review which was recently completed. Well respected scientists from across the country, including officials at the ATSDR, have openly challenged the validity of this review. This review significantly downplayed the level of exposure Camp Lejeune residents had to TCE and PCE chemicals found in the Camp Lejeune's water—potable water—system and it also did not take into account the EPA's draft health risk assessments for these chemicals. It also significantly downplayed the adverse health effects resulting from such exposure and did not assess scientific associations between benzene and vinyl chloride in adverse health effects.

Benzene, a chemical, was leaking into the water supply at Camp Lejeune at a rate of 1,500 gallons per month. Furthermore, we all understand that there were no specific Federal regulatory standards regarding volatile organic compounds until the late 1980s. However, I think it is important to note that the Navy and Marine Corps had their own regulations regarding the operation of drink-

ing water systems and the disposal of contaminants and hazardous waste.

It is impossible to know with 100 percent certainty what happened over 25 years ago, but I think it is important that the most comprehensive understanding possible of the actions that were taken and not taken during the contamination period, the origins of the contamination, as well as where the contamination sites were located, be given. Even more importantly, I believe that this information must be explained to the public in an understandable fashion.

I believe that Congress, the Navy, and the Marine Corps need to work together to develop an action plan to take care of the victims that were exposed to this contaminated water. While this is happening, I encourage the Chairman and the Committee to consider legislation introduced by Senator Burr, which I co-sponsored along with five other senators. It provides veterans and their families who are suffering from adverse health effects associated with Camp Lejeune's contaminated water to obtain health care from the VA.

This issue is not just about North Carolina. These men and women are living all over our country now. We cannot leave these families with mounting medical problems and half answers.

Thank you, Chairman Akaka and Senator Burr for the opportunity to speak today.

Chairman AKAKA. Thank you very much, Senator Hagan. I am delighted to have my friend from Oregon here, Senator Wyden.

STATEMENT OF HON. RON WYDEN,
U.S. SENATOR FROM OREGAN

Senator WYDEN. Thank you very much, Mr. Chairman, for your thoughtfulness, and Senator Burr, and for the opportunity to spend a few minutes here. I would ask unanimous consent that my full remarks go into your record and would just touch on a couple of issues this morning.

Chairman AKAKA. Without objection, it will be included in the record.

Senator WYDEN. Mr. Chairman and colleagues, I am very glad that you are looking at this critically important issue. National Guard soldiers from my home State have told me about their exposure to hexavalent chromium at Qarmat Ali in Iraq. The soldiers have told me about how their rooms were filled with toxic smoke from open air burn pits and they have told me about their struggles with the agency trying to secure benefits and health care. I very much appreciate, Mr. Chairman, your putting a spotlight on this issue, and particularly working to make sure that the Department of Veterans Affairs gets our veterans the benefits they need and that they are treated with respect and attention.

Mr. Chairman and colleagues, I think we all understand that nobody at the VA gets up in the morning and says, I want to spend my day being rotten to veterans. They all mean well. They care about our veterans deeply, yet, so often the system can be inflexible and our veterans get caught in red tape.

On September 19, I received what I felt was a positive letter from then Secretary of the Army, Pete Geren, who told me, I quote, "The VA is working internally to use the registry and the list of

possible medical issues from chromium exposure to establish a service connection."

Yet, because a service connection has not been established by DOD and the VA, some of our veterans get caught in this morass of red tape when they ought to be receiving treatment for respiratory problems, skin and eye problems, and even cancer that they picked up as a result of their exposure to chromium.

One Oregon National Guard soldier was told, and I quote, "Exposure is not a disability, nor does the VA pay compensation for exposure." Then that soldier was told to go out and produce 15 pieces of evidence if he hoped to receive any kind of treatment for his illness. I think our colleagues, whether you are a Democrat or Republican, would agree that veterans should not be subjected to this kind of merry-go-round approach.

It is not enough for the agencies to say they want to help and then, when the soldiers have to find their way through the bureaucracy, there is nobody there to get them their benefits. They face enough when they go into combat; they should not have to battle their government to get medical care when they return home.

I know you are going to hear from a variety of very thoughtful witnesses this morning who are going to talk about what is needed to make sure our veterans are properly cared for.

Mr. Chairman and colleagues, thank you very much for the chance to come and offer the vantage point from some Oregon National Guard members who have reported to me. We have one of the highest levels of participation in the Guard in the country. We feel very strongly in our State about ensuring that they receive adequate medical care when they have been injured, when in harm's way, and we thank you for your thoughtfulness to be able to come and spend a few minutes and lay out their concerns.

Chairman AKAKA. Thank you very much, Senator Wyden, for your statement.

I want to now welcome our first panel this morning. Our first witness is Mike Partain, who is testifying in regard to Camp Lejeune. We have Dr. John Nuckols, who is a professor at Colorado State University and a member of the Committee on Contaminated Drinking Water at Camp Lejeune.

Next we have Stacy Pennington, sister of SSG. Steve Ochs, who was exposed to burn pits and died in 2008. She is followed by Dr. Robert F. Miller, who is an associate professor of pulmonary and critical care medicine at Vanderbilt University Medical Center and has studied health effects of environmental exposures like burn pits.

We also have Laurie Paganelli, who will testify in regard to the Atsugi Naval Air Facility in Japan. She will be followed by Dr. Charles Feigley, who is a professor at the University of South Carolina and was also the chair of the subcommittee on the Atsugi incinerator for the National Resource Council.

Our final witnesses are Dr. Herman Gibb, who will testify in regard to health effects related to Qarmat Ali; and Russell Powell, who will testify about his experiences at the same facility. I want to thank the Veterans of Foreign Wars for making it possible for Mr. Powell to share his story with the Committee today.

I thank you all for being here this morning. Your full testimony will, of course, appear in the record. Mr. Partain, will you please begin?

STATEMENT OF MIKE PARTAIN

Mr. PARTAIN. Good morning, Mr. Chairman.

Chairman AKAKA. Good morning.

Mr. PARTAIN. Good morning, Mr. Chairman. I would like to thank you, the Ranking Member, and Members of the Veterans' Affairs Committee for permitting me to testify this morning.

My name is Michael Partain and I am son and grandson of U.S. Marine Corps officers. My parents were stationed at Marine Corps Base Camp Lejeune shortly after my father graduated from the U.S. Naval Academy. My father chose to live in base housing because he trusted the Marine Corps would protect his family.

I was conceived and carried while my parents lived on the base. During the time of my mother's pregnancy, we were exposed to high levels of tetrachloroethylene, trichloroethylene, dichloroethylene, benzene and vinyl chloride in the tap water provided to my family by the Marine Corps.

I was born at the base naval hospital in January 1968. Two years ago, I was diagnosed with male breast cancer at the age of 39. It is rare for this disease to strike men, especially young men such as myself. In fact, I am one of 40 men who share the unique commonality of male breast cancer and exposure to contaminated tap water aboard Camp Lejeune. Fortunately, I have health insurance which provides treatment for my disease. Even then, my battle with cancer has been a traumatic, emotional, physical, and a financial ordeal for my family.

Over the past 2 years, I have been in contact with numerous other families who are suffering from illnesses related to their exposures at Camp Lejeune. Many of these people do not have adequate health care or are now uninsurable because of their diseases. These families supported their Marines in body and spirit and now they have been left behind to suffer and die by the very organization they trusted and served faithfully.

Beginning on 31 October 1980, Navy and Marine Corps officials received what would later become a litany of warnings that the base's drinking water supply was highly contaminated with chlorinated hydrocarbons. The U.S. Army Environmental Hygiene Laboratory was tasked to analyze the base's tap water for trihalomethanes in preparation for a new EPA safe drinking water regulation. The Army lab warnings were repeated three more times between December 1980 and March 1981.

For some unknown reason, the Army lab further spelled out the issue by placing the word "solvents" with an exclamation point at the end of their March 1981 warning. Curiously, this key word was omitted from the 2007 Government Accountability Office review of the Camp Lejeune drinking water contamination. There was no documented action taken to identify the source of the contamination at that time.

On 6 May, 1982, Mike Hargett, co-owner of Grainger Laboratory, phoned the base chemist, Elizabeth Betz, and advised her that PCE and TCE contamination was found in the tap water samples

sent for TTHM analysis. Ms. Betz then notified her immediate supervisors. A week later, Ms. Betz was summoned to a briefing involving the base's facilities command staff. That is documented in her memorandum for the record. "It appeared to me that they had not been informed about the findings. I did not inform them."

Further testing revealed continued contamination. Grainger then wrote the commanding general of Camp Lejeune. "Interferences which were thought to be chlorinated hydrocarbons entered the quantization of certain trihalomethanes. These appear to be at high levels and hence, more important from a health standpoint than the total trihalomethane content. For these reasons, we called the situation to the attention of Camp Lejeune personnel."

The Grainger memo documented in writing that the contamination present in the potable water systems aboard the base was a serious issue. Grainger's chemist correctly concluded that the contaminants were located in the well fields for both Tarawa Terrace and Hadnot Point. No further action was taken by the Navy or Marine Corps officials.

Several months ago, I spoke to Mr. Hargett, former co-owner of Grainger Lab. He indicated to me that he had secretly tipped off the State of North Carolina that there was a problem with the TTHM testing program at the base. Shortly after this revelation, a State of North Carolina environmental engineer wrote to the base's assistant chief of staff facilities requesting the Grainger analytical data sheets which contained their notations of the contamination.

This request was ignored and then denied. It was not until 30 November 1984, that the Marine Corps officials began to finally close the contaminated wells at Camp Lejeune. Two weeks later, an article appeared in the base's newspaper. The article advised residents and personnel that four wells were removed from service due to traces of organic compounds which were unregulated by the Safe Drinking Water Act.

What the article failed to mention was that on 6 July 1984, Hadnot Point Well HP–602 was sampled and found to be highly contaminated with benzene. The base environmental engineer also failed to disclose to the readers the presence of a 20,000- to 30,000-gallon unreported and unremediated fuel leak dating back to 1979 which occurred on Hadnot Point. This fuel plume was in the groundwater and was 15 feet thick.

The minimization and deception did not end there. On 30 April 1985, the commanding general of Camp Lejeune advised the residents of Tarawa Terrace that two wells were taken offline because of minute trace amounts of—several organic chemicals were detected in the water. In September 1985, the base environmental engineer, Robert Alexander, was directly quoted in a newspaper that people had not been directly exposed to pollutants.

In November 1985, base officials, including Robert Alexander, informed the EPA that the contamination had not reached the distribution plants. What the Marine Corps has failed to disclose to Members of Congress, the media, and the public was that the Marine Corps was in violation of their own orders which date back to 1963. These orders, if followed, would have prevented most of the human exposures of Camp Lejeune.

One of these orders is the Bureau of Medicine and Surgery instruction known as BUMED 6240.3B. The purpose of the BUMED was to establish standards for water for drinking throughout the naval establishment, including Camp Lejeune. "Substances which may have a deleterious physiological effect or for which the physiological effect are not known shall not be introduced into the system in a manner which would permit them to reach the consumer."

There is also a Marine Corps order that specifically addresses safe disposal of chemicals on the base. In the interest of time, I will not go into the details during my opening statement. However, I am prepared to answer questions on both these documents.

In closing, I note at the table is a former member of the National Resource Council committee which produced the report that downplayed the health effects resulting from our exposures at Camp Lejeune. I also note with great concern, as Senator Burr indicated, the ASTDR, the agency statutorily tasked by Congress to assess health effects for national priority sites such as Camp Lejeune, is not represented in this hearing.

The NRC's report contains numerous flaws, including the committee's failure to assess our exposures to benzene and vinyl chloride. I respectfully submit that the Senate Veterans' Affairs Committee seek out the professional recommendations of the project manager in charge of ATSDR's Camp Lejeune studies.

I thank you for your time.

[The prepared statement of follows:]

PREPARED STATEMENT OF MICHAEL SEAN PARTAIN

Good Morning Mr. Chairman. I would like to thank the Chairman, Ranking member and members of the Veteran's Affairs Committee for permitting me to testify this morning.

My Name is Michael Partain and I am the son and grandson of U.S. Marine Corps Officers. My parents were stationed aboard Marine Corps Base Camp Lejeune shortly after my father graduated from the United States Naval Academy. I was conceived, carried and then born at the base Naval Hospital while my parents lived in base housing. During the time of my mother's pregnancy, we were exposed to high levels of tetrachloroethylene (PCE), trichloroethylene (TCE), dichloroethylene (DCE), benzene and vinyl chloride in the tap water provided to my family by the Marine Corps. Two years ago, I was diagnosed with male breast cancer at the age of thirty nine. In fact, I am one of about forty men who share this unique commonality of male breast cancer and exposure to contaminated tap water aboard Camp Lejeune.

Beginning on 31 October 1980, Navy and Marine Corps officials received what would later become a litany of warnings that the base's drinking water supply was highly contaminated with chlorinated hydrocarbons (see chronology, Oct 30 1980). The United States Army Environmental Hygiene Agency (USAEHA) laboratory located at Ft. McPherson, Georgia was tasked to analyze the base's tap water for trihalomethane's (TTHMs) in preparation for a new EPA Safe Drinking Water regulation. As part of their analysis for Hadnot Point's tap water, the laboratory stumbled across interferences caused by chlorinated hydrocarbons which inhibited the laboratory's ability to quantify the chemical they were testing for in the samples. The laboratory's supervisor documented these findings upon the analytical results sheet provided to Navy and Marine Corps officials. He advised that the base's tap water samples from Hadnot Point were highly contaminated with chlorinated hydrocarbons and they needed to test their water by Gas chromatography-mass spectrometry. This machine is used by scientist to identify specific compounds while in solution. The Army lab's warnings were repeated three more times between December 1980 and March 1981. For some unknown reason, the Army lab further spelled out the issue by placing the word (SOLVENTS!) at the end of their March 1981 warning (see chronology, March 9, 1981). Curiously, this key word was omitted from the 2007 Government Accountability Office (GAO) review of the Camp Lejeune Drinking water contamination when this document was cited on the GAO's timeline of events.

Between October 1980 and December 1981, no documented action was taken by Navy or Marine Corps officials to identify the source of the contamination. Later the following year, the Army lab reports were referred to in the base's Initial Assessment Study (IAS) draft report being prepared for the Navy's NACIP program. The Army lab's reliability was called into question in the review comments submitted by the base's Assistant Chief of Staff for Facilities, Colonel John T. Marshall,

> "it is important to note that accuracy of data provided by the U.S. Army laboratory is questionable. It is recommended that the TTHM information be de-emphasized throughout the report."

How could these reports be questionable if they were never investigated or verified? Oddly enough, Colonel Marshall's review was written fifteen days after the base received a written report from yet another lab verifying the legitimacy of the Army lab warnings. The other lab's data was not included in the final IAS report released in April 1983. The IAS report concluded that none of the twenty sites aboard Camp Lejeune slated for further study posed an immediate threat to human health.

The Navy and Marine Corps' lack of action was not the case for the entire base. Within weeks of the March 1981 USAEHA warning that solvents were contaminating Hadnot Point's water, Navy and base officials discovered organic contamination at the base's Rifle Range water distribution system located near the base chemical dump. Between March and May 1981, Navy and base officials sampled the Rifle Range's tap water and the system's potable water wells for contamination. Then on 31 July 1981, J.R. Bailey from the Navy's Facilities Engineering Command wrote to the Commanding General of Camp Lejeune advising the General that Rifle Range potable water well RR–97 contained organic contamination and that two other wells should be used in preference over this well due to lower levels of contamination found in those wells. The Rifle Range water distribution system only served a handful of permanent residents, unlike Hadnot Point's system which served enlisted barracks, bachelor officer's quarters, the base Naval Hospital and other facilities located on Hadnot Point. What is puzzling is why the Navy and Marine Corps went through the trouble of testing specific potable water wells for a remote potable water system on the base and then failed to test the other systems serving the vast majority of people on the base for another three and a half years. Why were the USAEHA lab warnings to the base ignored?

In September 1981 the USAEHA Lab experienced equipment problems and a back log of tests. As a result, the lab was unable to perform further TTHM testing for Camp Lejeune. A replacement was needed. In April 1982, Grainger laboratory was contracted to perform TTHM testing for Camp Lejeune. At this time, the testing was expanded to include a new water distribution system aboard the base. That distribution system was for the Tarawa Terrace (TT) family housing area. The initial samples were collected in April 1982 and analyzed by the laboratory. Then on 6 May 1982 Mike Hargett, co-owner of Grainger Laboratory, phoned the base chemist, Elizabeth Betz and advised her that PCE and TCE contamination was found in the tape water samples sent for TTHM analysis. Ms. Betz then notified the Supervisory Ecologist, Danny Sharpe, of the Grainger findings and these findings were then sent up the chain of command to Billy Elston, Deputy Base Maintenance Officer and to the Utilities Director, Fred Cone. A week later, on 14 May 1982, Betz was summoned to a briefing involving the base's facilities command staff. The purpose of the briefing was to explain April's TTHM analysis results to Colonel Millice, the Assistant Chief of Staff, Facilities, and Lt Colonel Fitzgerald, Deputy Base Maintenance officer. Betz documented in her memorandum for the record that

> "it appeared to me that they had not been informed about the findings. I did not inform them."

The findings mentioned in the memorandum were the existence of PCE and TCE in the tap water for Hadnot Point and Tarawa Terrace's potable water distribution systems.

Shortly after the briefing, a second round of TTHM sampling was collected for Camp Lejeune. However, some of these samples had problems with air bubbles and interfered with the testing performed by Grainger Labs. A new round was collected and sent to Grainger. Nonetheless, Mike Hargett and Grainger labs found that the solvent peaks discovered in the April samples were still present but the comparison with the duplicate samples indicated poor repeatability. Betz and Hargett agreed to collect yet another sample for testing. This sample was taken at the end of June. The Grainger Lab report indicated interference in one of the samples but there is no explanation of what was causing the interference. As a result of the continued interference, Betz specifically collected samples from both the Tarawa Terrace and Hadnot Point water treatment plants for special testing of these two systems. One sample was taken from the raw water entering the plant which represented the well

fields providing untreated water to the plants and the other from the treated water distributed from the plants to the consumers. One can logically conclude that the ensuing test results from these samples would clearly demonstrate whether the interference problem was emanating at the water treatment plant(s) or in well(s) supplying raw water to the treatment plants. The samples were collected and packed in ice and then shipped to Grainger Labs in Raleigh North Carolina.

Immediately following the sample shipment, Betz called the state of North Carolina and spoke to Linda Sewall concerning TTHM reporting requirements. At the end of the conversation, Betz asked Linda Sewall which Safe Drinking Water Act secondary contaminants were required to be reported. PCE and TCE were not listed among the SDWA secondary contaminants. Betz did not inform Ms. Sewall that PCE and TCE were found in the potable water aboard the base.

The Grainger report arrived at the base on August 10th 1982:

> "Interferences which were thought to be chlorinated hydrocarbons hindered the quantization of certain trihalomethanes. These appeared to be at high levels and hence more important from a health standpoint than the total trihalomethane content. For these reasons we called the situation to the attention of Camp Lejeune personnel."

The Grainger Lab memo documented in writing that the contamination in the potable water systems aboard the base was a serious issue. Grainger's chemist, Bruce Babson, correctly concluded that the contaminants were in the well fields for both Tarawa Terrace and Hadnot Point. If the contamination was emanating from wells there could be but one logical conclusion. The groundwater supplying the wells aboard the base was contaminated! No further action was taken by Navy or Marine Corps officials.

In her 19 August 1982 memorandum for the record, Betz incorrectly states the presence of PCE in the base's potable water is linked to the presence of vinyl lined asbestos coated pipes in the base's water distribution system. This scenario was based on a 1980 Suggested Action Guidance Report on Tetrachloroethylene issued by the EPA, that the contamination could be a result of vinyl lined asbestos coated water pipes. There was no documented action taken to test this theory. In fact, according to base records dating back to 1983, vinyl lined asbestos cement pipes were not used as construction materials for any of the base's water distribution systems. The question remains, after the 10 August 1982 warning from Grainger laboratory, why did Navy and Maine Corps officials fail to go out and test the individual wells supplying the water distribution systems for Hadnot Point and Tarawa Terrace?

Then on 1 June 1983, Colonel Marshall compiled data for what was supposed to be a routine report on the TTHM analysis for the State of North Carolina. He sent the data in the form of a table contained in a letter to Charles Rundgren of the State's Water Supply Branch. The original analytical Grainger lab TTHM data sheets were not included in this letter. These data sheets contained Grainger's findings for the TTHM readings including notations that PCE and TCE were contaminating the samples. Several months ago I spoke to Mr. Hargett, former co-owner of Grainger Laboratory, and he indicated to me that he had secretly tipped off the state of North Carolina that there was a problem with the base's TTHM testing program. Colonel Marshall's letter was supposed to be a routine communication to document base compliance with the new TTHM regulations slated to take effect by November 1983. Later that month, Colonel Marshall received a reply from the State's Environmental Engineer, William Elmore. Mr. Elmore thanked Colonel Marshall for the data compilation but informed him that the State required the raw analytical data on the actual forms used by Grainger Laboratory. The reports requested by Mr. Elmore were the very same reports upon which Grainger Lab had documented the existence of tetrachloroethylene and trichloroethylene within the potable water supply systems for Hadnot Point and Tarawa Terrace beginning in 1982. Colonel Marshall stalled and did nothing. His successor, Colonel Lilley then inherited the problem of what to do with Mr. Elmore's request. On 30 November 1983, Colonel Lilley called the North Carolina's water supply branch and spoke with Dick Caspers. We do not know what was said in the conversation with Mr. Caspers, but two weeks later, Col Lilley wrote Mr. Elmore and advised him that per this conversation with Mr. Caspers, Marine Corps Base Camp Lejeune was not required to provide the requested Grainger Laboratory reports and thus they were not submitted to the State.

It took another year before the drinking water contamination aboard Camp Lejeune was "officially discovered". Today the Marine Corps maintains that "once the source of the chemicals was determined to be the wells, the wells were immediately taken out of service." The Marine Corps also now states that "taking care of Marines, Sailors, their families and civilian workers is our top priority." My previous

testimony belies the former statement and the following will cast serious doubt on the latter.

Two weeks after the first well was removed on service on at Hadnot Point, an article appeared in the base's newspaper. The article advised the reader that as a result of samples taken on 3 December 1984, four wells were removed from service due to traces of organic compounds. The article also read that none of the organic compounds were listed under the Safe Drinking Water Act. The article went on to quote the Base Environmental Engineer, Robert Alexander:

> "every effort will be made to maintain the excellent quality water supply traditionally provided to residents of Camp Lejeune."

What the article failed to mention was that on 6 July 1984, Hadnot Point well HP–602 was sampled and found to be highly contaminated with benzene. This well remained operational until November 1984. The well was situated down gradient from the Hadnot Point fuel farm and thus exposed to the fuel leaking from the underground tanks. The Base Environmental engineer also failed to disclose to the readers the presence of a 20,000–30,000 unreported and un-remediated fuel leak dating back to 1979. This fuel plume was in the ground water and was fifteen feet thick! Environmental Engineering Company's report warned the presence of benzene far exceeded the human health risk and therefore the use of the well (HP–602) should be discontinued immediately.

The deception did not end there. On 30 April 1985, the Commanding General of Camp Lejeune advised that residents of Tarawa Terrace that two wells had to be taken of line because minute (trace) amounts of several organic chemicals were detected in the water. The General also stated:

> "There are no definitive State of Federal regulations regarding a safe level of these compounds, but as a precaution, I have ordered closure of these wells."

Four months later, the Base Environmental Engineer, Robert Alexander, was directly quoted in a newspaper article:

> "people had not been directly exposed to the pollutants."

The misrepresentation did not end with the public and the media, it extended to the EPA. On 1 November 1985, there was a meeting at Camp Lejeune between base officials and EPA Representatives. During this meeting, base officials including Robert Alexander told the EPA that the contamination had not reached the distribution plants. Three years later another base official, Assistant Chief of Staff Facilities, Colonel Thomas J Dalzell was quoted in the media that prior to 1983:

> "At that time we were not aware of any of these particular compounds that might have been in the ground water and we have no information that anyone's health was in any danger at that time." The Colonel also stated that the sources of the contamination were the base's motor pools and that these compounds were being dumped in the ground or in the sewers and that they were not really aware of the effects on ground water back in the 1960's and 1970's.

Beginning with the very first public announcement of the drinking water contamination aboard Camp Lejeune, there has been a constant drum beat by the Marine Corps that they did not violate any Federal Safe Drinking Water Act standard or any State of North Carolina standards. On September 24th 2009, Maj-General Jensen appeared on CNN's Campbell Brown show and reiterated the Marine Corps official position. What the Marine Corps has failed to disclose to Members of Congress, the media, the public and prior investigations into the Camp Lejeune's drinking water contamination was that the Marine Corps was in violation of their own orders dating back to 1963. These orders if followed would have prevented most of the human exposures at the base.

In September 1963, the Navy's Bureau of Medicine and Surgery issued a set of instructions known as BUMED 6240.3B. These instructions were revised in 1972 with version C and then replaced in 1988. The purpose of BUMED 6240.3B was to establish standards for water for drinking throughout the Naval establishment including Camp Lejeune. Contained within the instructions were preventive measures, including the requirement for frequent surveys to locate and identify health hazards which might exist in the system. Health Hazards were specially defined within the instructions as to be any conditions, devices, or practices in the water supply system and its operation which create or may create a danger to the health and well being of the water consumer. Supply wells were also defined as part of the water supply system. Pollution was defined as the presence of any foreign substance (organic, inorganic, radiological or biological) which tended to degrade its quality so as to constitute a hazard or impaired the usefulness of the water. Perhaps the most

disturbing part of the regulation is found under the chemical characteristics limits. Paragraph 7 subparagraph C:

> "Substances which may have deleterious physiological effect, or for which the physiological effects are not known, shall not be introduced into the system in a manner which would permit them to reach the consumer."

These standards have yet to be publicly addressed or explained by the Navy. Instead the Navy and Marine Corps summarily dismisses this potable water regulation as being to general to be a standard of care.

During our research of Navy and Marine Corps documents we discovered another key document which undermines the Marine Corps and Navy's official statements that they had little knowledge that these chemicals could contaminate the ground water at Camp Lejeune. Base Order 5100.13B was the third revision of an order from the Commanding General of Camp Lejeune. The order dates back to June 1974 and may date back to the creation of the base's chemical dump in 1959. We will not know the actual beginning date of the order until the Marine Corps produces the prior two versions of the order and the higher headquarter guidance which created the order in the fist place. The purpose of Base Order 5100.13B was for the safe disposal of contaminants or hazardous wastes. The order identified organic solvents as hazardous materials and ominously warned that improper disposal of contaminants and hazardous materials created hazards such as contamination of drinking water. As I read BUMED 6240.3B and Base Order 5100.13B a line from a famous movie called "A Few Good Men" comes to mind. "We follow orders, or people die. It's that simple." At Camp Lejeune, orders were not followed and people have died or were made sick due to the negligence of the United States Marine Corps.

Submitted with this testimony is our copy of the historical time line of events for the Camp Lejeune drinking water contamination. The time line was painstakingly researched using authentic Navy and Marine Corps documents. Each entry is referenced to an actual document. We have also provided a copy of the document library for Members of the Committee and their staff. The document library was provided to us by the ATSDR.

ATTACHMENT: HISTORICAL TIME LINE OF EVENTS FOR THE CAMP LEJEUNE DRINKING WATER CONTAMINATION

Marine Corps Base Camp Lejeune chronology of significant events concerning contamination of the base drinking water supply©. Part 1 1941 through October 1989. Compiled by Mike Partain for use by WWW.TFTPTF.COM

Introduction – This time line was compiled by means of public documents available from the CERCLA and CLW files kept under requirements of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. There are many documents that still have not been released or are currently being suppressed from public view. As these documents become available, we will update this time line and promptly post it on our website.

We are currently working towards completing the second installment of this time line. The research needed to untangle the many documents, errors, hidden information and obfuscation of facts will take some time. We will post the second portion of the time line as soon as it becomes available.

1941 – Hadnot Point Fuel Farm Constructed southeast of Holcomb Blvd adjacent to Ash street. The fuel farm was comprised of 15 fuel tanks. There was one 600,000 gallon above ground tank, six underground 12,000 gallon tanks, and eight underground 15,000 gallon tanks. The underground tanks were placed at grade and completely covered with soil. The above ground tank stored diesel fuel while the other tanks stored gasoline, unleaded gasoline and kerosene. The tanks were located in a highly developed area of the base where natural drainage had been modified by extensive areas of asphalt, concrete, ditches and storm sewers. Hadnot Point supply well HP-602 was located 1,200 feet northwest of the Hadnot Point Fuel Farm. Marine Corps records indicate that 20,000 to 33,150 gallons of fuel were lost over the course of the fuel farm's operation. This estimate did not include or account for product lost during transfers or unreported leaks. **(Cercla 417).**

1950-1952 Installation of Tarawa Terrace (TT) well field and construction of Tarawa Terrace subdivision by Spangler Construction. Three of the initial wells were located along Lejeune Blvd down gradient from established gas stations, automobile repair shops and dry cleaners. These businesses (and residences) were at the time, all on septic ground absorptions systems until city sewers were installed in the1970's. **(Bozarth Interview 1994).**

1952- Tarawa Terrace well number TT-26 Constructed. It was located on the base property line along Lejeune Blvd. The well was drilled to a depth of only 95 feet **(CLW 3548)**. Less than a year after construction, ABC Dry Cleaners became operational. The well was now situated less than 900 feet and down gradient from yet another potential contamination source. The well was also down gradient of Glamorama dry cleaners, gasoline stations, and auto repair facilities. In January 1985, this well tested 1580 ppb PCE. **(CLW 5011 + CLW 4810).**

1953 – ABC One Hour Dry Cleaner begins operation at 2127 Lejeune Blvd. The business was located directly across the street from the Tarawa Terrace well fields. According to co-owner Victor Melts, ABC uses 110-165 gallons of Tetrachloroethylene (PCE) per month. The business disposes waste water through an on site septic ground soil absorption system that was located up gradient and directly across the street from the Tarawa Terrace water distribution system's well fields and family housing. The business also generates a solid waste from the PCE reclamation process. This waste was contaminated with PCE and was used as pothole fillers or deposited in the rear of the business from 1953 until 1984. **(VJ Melts Depo 04/01).**

1953 – Possible nerve gas or mustard gas drums were buried near the Rifle Range Chemical dump. According to a 1982 interview with a former civilian employee named Jerry Rochelle, 50-55 drums were buried at the site. Mr. Rochelle noted that the drums were light or bluish green and unmarked. They were protected by rubber matting aboard the trucks and were handled by equipment which had been rubber padded. Mr. Rochelle was required to wear extensive protective gear including a gas mask, hood jacket and gauntlets. He noted that other personnel wore what he called "space suits." The drums were buried five feet below the surface side by sides several rows deep. **(Cercla 280).**

1958 – Legrand preliminary and interim ground water report was published for Marine Corps Base Camp Lejeune (MCBCL). The report establishes that Camp Lejeune's ground water wells were generally effective up to a depth of 250 feet. Below that depth the water was unsuitable for use. It was noted that the use of shallow wells directly alongside Lejeune Blvd would furnish more than the anticipated water supply for Tarawa Terrace. The disadvantage of these wells was that they would require frequent maintenance inspections and repairs. Furthermore, in 1983, the Initial Assessment study for Camp Lejeune stated the soil was composed of fine sand and was extremely permeable with little or no confining layers that would prevent surface generated contaminants from reaching the aquifer. **(CLW 1, CLW 32, CLW 4819-20 & Cercla 1998)**.

1959 – Ed Carper Assumes Administrative control of Camp Lejeune's Chemical Dump. The dump was established in the early to mid 1950's and used as a dump for hazardous materials. The dump was located near the rifle range. Mr. Carper ran the dump until 1965, when Mr. Don Tallman assumed control. Mr. Tallman administered the dump until 1976 when it was closed. Materials disposed of in the dump included but were not limited to TCE and other PPP chemicals. Mr. Tallman noted in his 1982 statement that Base order 5100.13B was expanded in 1974 to include the Air Station. Earlier versions of the order including the order which created the chemical dump and why it was used are now missing. Base Order 5100.13B did clearly establish that hazardous substances such as organic solvents were hazardous and the chemical dump was the designated place for their disposal. **(Cercla 226).**

June 1959 – Legrand Survey and Evaluation of water supply wells at Camp Lejeune. The report states development of the water wells at Lejeune has reached the stage in which continuous technical assistance in ground water hydrology would be worthwhile. A concern was expressed about increased withdrawal of groundwater (including intra-aquifer movement), especially at Hadnot Point, will increase salt-water encroachment. In 1986, MCBCL consulted with the United States Geological Service (USGS) for a survey of the groundwater at the base to assist in planning, development and protection of the groundwater supply aboard the base. **(CLW 102).** The USGS found that there was a very dependable source of water aboard the base. However, the aquifer was not well protected from potential surface contamination because clay layers above the water supply aquifer that might serve as a barrier to contamination are thin and discontinuous. The survey also found that with some relatively inexpensive modifications in the design and positioning of future supply wells could significantly improve well yields and reduce costs. **(Cercla 1998).**

December 1959 – Department of the Navy Bureau of Medicine and Surgery (BUMED) issued instruction 6240.3A; Standards for potable water. This instruction applied to all U.S. Naval vessels and shore installations which included United States Marine Corps (USMC) installations. The standard defined Health Hazard to mean any faulty operating condition including any device or water treatment practice, which when introduced into the water supply system creates or may a create a danger to the well being of the consumer. **(BUMED 6240.3A).**

1963 - Department of the Navy Bureau of Medicine and Surgery (BUMED) issued instruction 6240.3B Standards for potable water. Regulations are substantially revised from prior version (6240.3A). The definition of a health hazard is expanded to include an example. The example cited a structural defect in the water supply system by either location, design or construction that prevents the satisfactory purification of the water or causes it to be polluted from extraneous sources. Pollution is defined as the presence of any foreign substance (organic, inorganic, radiological or biological) in the water which tends to degrade its quality so as to constitute a hazard. The instruction also requires substances which may have a deleterious (harmful) physiological effect or for which the physiological effects are not known, shall not be introduced into the water system in a manner which would permit them to reach the consumer. **Water supply wells are defined within the instruction as part of the water system**. **(BUMED 6240.3B).**

1970 – DDT, trichloroethylene and calcium hypo-chlorate buried in a pit at the rifle range chemical dump. During the burial an explosion occurred which injured the bulldozer operator. The operator required medical treatment for 2 years. **(Cercla 208).**

1972—Hadnot point supply well number 651 installed adjacent to lot 203. Lot 203 was the base Defense Reutilization Management Office (DRMO Lot) i.e....junkyard. The DRMO lot had been in operation for decades and was well establish at the time well HP-651 was constructed in 1971. **(CLW 726).** Well 651 was drilled to a depth of 199 feet **(CLW 3546)** and became operational in January of 1972. On 4 February 1985, this well tested 400 ppb PCE, 18,900 ppb trichloroethylene (TCE), 7,580 ppb dichlororethylene (DCE) and 168 ppb Vinyl Chloride. **(CLW**

5011). The Naval Assessment and Control of Institutional Pollutants (NACIP) program's Initial Assessment Study (IAS) of 1983 also identified lot 203 as a dumping ground for dichloro-diphenyl-trichloroethane (DDT) and Polychlorinated B-phenyls (PCB) laden transformers **(CLW 726).**

1972 – Holcomb Boulevard Water Treatment Plant (WTP) and distribution system became operational. Water to Paradise Point, Berkeley Manor, Watkins Village, Midway Park Family housing areas and irrigation water for both of the base's golf courses were now supplied by Holcomb Boulevard water distribution system. Prior to 1972, these same areas were served by the Hadnot Point System. However, Holcomb Blvd water distribution system remained intra-connected with the Hadnot Point water distribution system. This intra-connection was controlled by 2 isolation valves which were located at the bridges which crossed over Wallace Creek on Holcomb Blvd. and the Main Service road by Marston Pavilion. During times of water shortages or system problems, these valves could be opened to allow treated or raw water to flow in either direction to either plant. Recent developments reveal that these valves were frequently activated to allow contaminated Hadnot Point water to enter and be distributed through the Holcomb Blvd water distribution system between 1972 through 1985. The use of treated water to irrigate the base's championship golf course and secondary golf course appears to be the main reason why there was a continual shortage of treated water at Holcomb Blvd. **(CLW 1264).** On 27 January 1985. Holcomb Boulevard suffered a generator fuel spill leak and gasoline was leaked into the water system. The valve(s) interconnecting the 2 systems was/were activated for a nine day period resulting in a documented contamination event for the above cited family housing areas, facilities and schools served by Holcomb Boulevard. **(CLW 4514 & CLW 4546).**

December 13 1972 - Revision 3C of Department of the Navy Bureau of Medicine and Surgery (BUMED 6240) instruction for standards for potable water. Within the new instruction there was yet another provision for the rejection of a water supply source. The BUMED reads "the presence of the following substances in excess of the concentrations listed shall constitute grounds for rejection of the supply:" Chlorinated Hydrocarbons were listed with a value of 3-100ppb. PCE, TCE and organic pesticides are chlorinated hydrocarbons. **(CLW 14).**

June 27 1974 – Base Order 5100.13B Safe Disposal of Contaminants or Hazardous Waste. The purpose of this order was to set forth responsibilities for the safe disposal of subject hazardous wastes such as **"organic solvents"**. The order also recognized that improper practices of disposal created hazards such as **contamination of drinking water. (CLW 5996).** According to the last Administrator of the dump, Don Tallman, the 5100.13B revision of the base order was to include the Air Station into the order. **(Cercla 226)**

October 24 1977 – Southern Testing and Research Laboratories performs testing for four specific chlorinated hydrocarbons (Lindane, Endrin, Toxapehene and Methoxychlor) and 2 herbicides. The contract is for testing for these contaminants only. The detection limit is set at 1 part per billion (ppb) and 0.1 ppb respectively. The lab report was negative for these chemicals. The samples were received September 15th and analyzed on October 24 1977 after a month's delay. **The delay in testing casts serious questions to the validity of the results. (CLW 172).**

1977 – Pease Air Force Base New Hampshire. The base supply wells were analyzed after complaints about fuel odors in the drinking water. The water from the supply wells was found to contain trichloroethylene (TCE). The contaminated supply wells were then shut off and water was provided to the base by the city of Portsmouth. **(ATSDR PHA Pease AFB, New Hampshire).**

1978 — Memo titled Primacy of Safe Drinking Water Act (SDWA) and N.C. Potable water laws. The base prepares to co-ordinate operation and inspection of the water utilities in accordance to state law. Certification was required of the lab and plant operators. The state now required daily tests for bacteria and chemicals in the water. It was noted that when the new criteria went into effect, then the base would have need of an increase in lab and plant personnel. Julian Wooten was designated by the base as the single point of contact for all matters pertaining to the SDWA and the state. Utilities personnel would also be subjected to state laws and operating procedures. **(CLW 173).**

February 28 1978 – Letter from J.G. Leech of Naval Facilities Engineering Command (NavFacEngCom) to Charles Rundgren Water Supply Branch State of North Carolina concerning North Carolina's implementation of the Safe drinking Water Act. **The letter confirms that all monitoring data, operational logs,** requests for laboratory certification or special analysis concerning Marine Corps activities within North Carolina will be submitted to the

state. NavFacEngCom requested that the state provide all relevant rules, regulation, newsletter, forms etc. be provided to them. **(CLW 176).** (The well operating logs have yet to be turned over to ATSDR. Verbally, the Department of the Navy advised they no longer have any copies of these logs. According to ATSDR representatives, the files pertaining to Camp Lejeune's drinking water systems are missing from the State archives. The missing files pertained only to the time frame of the drinking water contamination.)

May 8 1978—Safe Drinking Water Act meeting. The meeting was attended by N.C. Department of Human Resources, base officials, Navy and Marine Corps officials. Charles Rundgren and Dr. Dyre of N.C. Dept. of Human Resources discuss testing state laboratories could provide to Camp Lejeune if specifically requested. However, Mr. Rundgren advised that because of their work load they were reluctant to take on anymore work. The state advised that they can provide tests for all organic, inorganic and radiological materials. **(CLW 3554)**. On October 1978, the Marine Corps requested the state to provide testing for the base. **(CLW 187)**.

September 7 1978—Memo titled Leachate from Solid waste and chemical landfills; monitoring of. "Because groundwater is used extensively as a potable water source at Camp Lejeune, current land disposal facilities should be monitored to indicate, as early as possible, any movement of contaminants from either disposal facility into the groundwater." **(CLW 3558)**.

October 10 1978-- Camp Lejeune reports elevated Coliform bacteria readings at the Courthouse Bay system. **(CLW 185).**

- **Oct 13 1978 --** NavFacEngCom letter 114:DPG ser 6280 13 Oct 1978, it was noted that there was a rapid increase in sewage and water discharges at the base. NavFacEngCom advised that if the current growth trends continued, MCBCL water and sewage treatment facilities capacity will be exceeded in the early 1980's. This was significant because increased growth meant increased usage upon the existing wells in the system. If not properly planned, as indicated in the 1959 Legrand Hydrological report **(CLW 1 and CLW 32)**, the water table would be in danger of salt water encroachment and more importantly, the increased draw from increased pumping has the effect of pulling surrounding water in towards the well heads. If the well head was situated near a contamination source such as wells HP 651 and TT 26, the contaminated water will be increasingly drawn into the well. **(CLW 274)**.

1979 – Fuel leak at Hadnot Point Fuel Farm. An estimated 20,000 to 30,000 gallons of fuel product leaked from the Hadnot Point Fuel Farm. The exact details of the leak and if any clean up was performed is unknown at this time. **(Cercla 417).**

1979 – Water testing at Willow Grove Naval Air Station in Pennsylvania revealed tetrachloroethylene (PCE) and TCE contamination in the base's drinking water supply. According to a 2002 Agency for Toxic Substances and Disease Registry (ATSDR) report, the well was no longer used for drinking water. Please refer to the following excerpt from the 2002 report: "Sampling of station supply wells began in 1979, when groundwater contamination was found in areas throughout the region. Data from 1979, when contamination was discovered, to 1984 reported maximum detected concentrations of 300 part per billion (ppb) of TCE and 91 ppb of PCE in on-site supply wells. The second highest detected levels in this time period were 68 ppb of TCE and 79 ppb of PCE.~ **After contamination was detected, this well was used mainly for fire protection, and not drinking water.**" **(2002 ATSDR PHA Willow Grove NAS).**

1979 – Warminster Naval Air Warfare Center Pennsylvania began sampling on-base water supply wells in 1979 when groundwater contamination in the area was first discovered. Based on the 1979 sampling results,the Navy closed Wells 1, 2, and 5 due to VOC contamination. **(ATSDR PHA for Warminster Naval Air Warfare Center).**

February 8 1979— NavFacEngCom letter to Commanding General MCBCL. Camp Lejeune was cited by EPA as a "major polluter" because of noncompliance with legal requirements listed under the National Pollutant Discharge Elimination System. This violation stems from sewage treatment and industrial wastewater/oil discharges to 71 different storm drains. The report states that several hundred corrective actions will be necessary to bring the base into compliance. **(CLW 276)**.

April 1979 -- Study of Tarawa Terrace (TT) and Montford Point Water Treatment Plants (WTPs) recommended demolishing plants due to age. The Holcomb Blvd plant was recommended to be expanded to serve Tarawa Terrace and Montford Point. A new transmission line will be needed to connect Holcomb Blvd. to these areas. The study cites serious operating problems have been experienced at Tarawa Terrace WTP due to the inability to properly control the water treatment process. Problems included cementing of filter sands, structural damage to the filter bed supports and short filter runs **(CLW 191)**. The report recommended the addition of three new wells at TT and two wells at Montford point **(CLW 195)**. Tarawa Terrace WTP remained operational until 1 April 1988.

November 20 1979 – Environmental Engineering Survey MCBCL. The report was prepared for Utilities, Energy and Environmental Divisions, and NavFacEngCom. The purpose of the study was to identify current facility environmental deficiencies and provide an update on previously identified projects.

1. At the time of the report, the Quality Control Lab Chemist position was vacant. The responsibility of the chemist was to supervise the base Quality Control lab. **(CLW 253).**
2. The Quality Control lab was not certified by the EPA. One of the lab's responsibilities was to perform chemical, physical and bacteriological analyses of potable water systems. **(CLW 253).**
3. A required 3 year inorganic chemical analysis for potable water was not completed. **(CLW 253).**
4. The water and sewage treatment plants exhibited evidence of sporadic maintenance problems and personnel shortages. The report noted a severe shortage of personnel in the Natural Resources and Environmental Affairs Division. It was recommended this division be adequately staffed in order perform/meet the necessary demands for the environmental program. **(CLW 256).**
5. Severe personnel shortages in the Natural Resources and Environmental Affairs Division limit current capability to perform/meet the necessary environmental program. **(CLW 350)**.
6. The state of North Carolina required at least one person in charge of the 8 potable water treatment plants at Lejeune posses a Class A license. The current person holding the position possessed a class B license. There was also a recommendation for the laboratory technician to attend an EPA training course to achieve an effective pollution control and abatement program. **(CLW 258-259)**.
7. All known areas of existing and potential oils spills and oily wastewater discharge on Base were previously identified. However, spill prevention control and countermeasures (SPCC) to eliminate/control spills from 55 gallon oil drums for an estimated 1,561 space heaters was deleted due to cost limitations. **(CLW 259).**
8. MCAS New River, Solvents, fluids and oil discharges were found to be draining from the helicopter pad area into the storm drainage system. **(CLW 260)**.
9. Hazardous Waste/Toxic Substances. Identification, handling and disposal of hazardous and toxic materials have in the past, been an area of relatively minor concern. New laws and an increasing frequency of accidents have rendered past handling and disposal methods unacceptable. **(CLW 262)**.
10. A survey was conducted of all transformers containing Polychlorinated B-phenyls (PCBs). A request was submitted to NavFacEngCom to provide assistance in preventing PCB spillage into the water ways. 304 transformers were located at the Defense Property Disposal Office (lot 203) awaiting disposal. **(CLW 263).**
11. 5,094 4oz cans of DDT were found awaiting disposal in a tractor trailer at DPDO (lot 203). **(CLW 263)**.
12. Volatile Organic Compounds (VOCs) trichloroethylene, toluene, and xylene are categorized as hazardous materials on an attachment to the survey. **(CLW 346)**.
13. A recommendation was made for Mr. Sonny White of NavFacEngCom be requested to visit MCBCL to evaluate/provide acceptable storage and disposal options for the hazardous waste program. **(CLW 351)**.

- **Nov 26 1979 –** Environmental Protection Agency (EPA) publishes Suggested No Adverse Reaction Level (SNARL) for TCE. The one day and 10 day SNARL values are determined for emergencies and spills for a short period of time. EPA recommended a one-day SNARL of 2,000 parts per billion (ppb), a ten-day SNARL of 200 ppb and a long-term SNARL of 75 ppb. "It should be assumed that drinking water would be the primary or sole source of human intake of trichloroethylene." The same report also advises that SNARL calculations for short term and chronic exposures ignore possible carcinogenic risk that may result from those exposures as well as any possible synergistic effect of other chemicals in the water. The EPA report also warned of long term carcinogenic effects in both male and female animals. Trichloroethylene was reported to be mutagenic in microorganisms It transformed cultured mammalian cells to carcinogenic cells that bound with tissue macromolecules. These observations comprised the basis for reasoning to support the carcinogenic potential of trichloroethylene. **(CLW 353).**

- **Nov 29 1979** -- EPA publishes final regulations for the control of total trihalomethanes ("TTHMs") as an amendment to the National Primary Drinking Water Standards. This regulation establishes a Maximum Contaminant Level (MCL) of 0.10 mg/L (parts per million) for TTHMs. A timeline was established for compliance and monitoring with this MCL. Water treatment systems serving between 10,000 and 75,000 people, such as Hadnot Point and Marine Corps Air Station (MCAS), New River WTPs, required mandatory monitoring to begin by 29 November 1982 and compliance with the new standard was to be achieved by 29 November 1983. Water treatment systems serving less than 10,000 people, such as TT, Montford Point, Rifle Range, Courthouse Bay, Onslow Beach, and Holcomb Blvd, the regulation left primacy with each respective state. **(CLW 6452).**

February 10 1980 – The EPA publishes SNARL in Federal Register for PCE. The EPA recommended a one-day SNARL of 2,300 ppb, a ten-day SNARL of 175 ppb, and a long-term SNARL of 20 ppb. This same report also advised that "SNARL calculations for short term and chronic exposures ignore possible carcinogenic risk that may result from those exposures as well as any possible synergistic effect of other chemicals in the water". Adverse effects to mice fetuses were also noted in the report. The adverse effects include lowered birth weight , increased fetus resorptions, split sternebrae, subcutaneous edema and delayed ossification of skull bones. A matter of interest was cited as part of the report. The matter was a 1978 article in Medical World News which discussed a mother who worked in a drycleaner during the time she was nursing her infant. The child developed jaundice and an enlarged livered. Both conditions ceased when the mother discontinued nursing. **(CLW 385).**

March 14 1980—State of North Carolina assumed primary enforcement responsibilities for the enforcement of Safe Drinking Water Act for all public water systems. **(CLW 425).**

April 9 1980 – Suggested Action Guidance Tetracholorethylene (PCE), published by the EPA. "Our recommendations for this situation (contamination of the drinking water with PCE) include: (1) immediate remedial action (within 24 hours) if the drinking water concentration of tetracholorethylene is found to exceed 2.3mg/l (2,300 ppb), equivalent to our 1-day SNARL, and (2) remedial action within 10 days if the tetracholorethylene concentration exceeds 0.13 mg/l (130ppb), equivalent to our 10 day SNARL. For extended exposures, we recommend, in addition, that the drinking water supplies should be maintained at no more than 0.04 mg/l (40 PPB) for any extended period." "The suggested action guidance should not imply that EPA condones the presence of any level of this contaminant in drinking water". **(CLW 391).**

June 27 1980 – Condition Survey for POL Facilities (Hadnot Point Fuel Farm) Camp Lejeune. The survey was conducted by Cal J Ingram of NavFacEngCom to determine the condition of the POL facilities for MCAS New River and Camp Lejeune. The survey was necessary due to leakage, problems, obsolescence and environmental/safety concerns. **(Cercla 96).** See PDF page 11.

The following recommendations were made for the Hadnot Point fuel farm.

1. The fuel facilities were approximately 35 years old. Mr. Ingram noted that because of age, there has been general corrosion and deterioration of the tanks and pipelines.
2. Maintenance over the years has been minimal due to insufficient funding. Funding to keep abreast of the latest state of the art was not available.
3. Camp Lejeune was deficient in new fueling designs including automatic high liquid alarms, tank coatings, dead man controls, impervious dikes and containment curbs.
4. The fuel storage tanks have never been cleaned since they were built.
5. There were many buried valves and flanges that can not be inspected or maintained.
6. An automatic liquid level indicator was installed but never made functional.
7. Above ground tank S-1009 (the 600,000 gallon tank) exterior coating was beginning to peel and evidence of rust. The protective dike was insufficient and not impervious. No locks were noted on the drain valve for the tank.
8. Tank S- 1031 was discovered to have a leaking valve and pitting in the interior bottom of the tank.

9. As a result of the leaking valve in tank S-1031, it was determined that another tank valve also leaked badly.A recommendation was made to test tank S-1009 as soon as possible to prevent leakage, loss of product and environmental contamination.
10. A recommendation was made to replace and install new piping, new tank valves and new concrete valve pits for all storage tanks. It was essential that all valves be accessible for proper maintenance.
11. A recommendation was made to empty and clean the interiors of all underground storage tanks and then inspect them for leaks.

Note, none of these recommendations were acted upon until 1989. Please see entry for 29 March 1988.

July 29 1980— NavFacEngCom letter dated 29 July 1980 initiated the TTHM surveillance program at Camp Lejeune to begin in October 1980 and terminate December 1981. The purpose was to establish a data base to characterize potable water supplies on base. Jennings Laboratories and the U.S. Army Environmental Hygiene Agency (USAEHA) lab were selected to analyze the base's water for TTHMs. **(CLW 448).**

October 1 1980 – LANTDIV arrives at MCBCL and collected a composite sample, composed of water from all eight WTPs. This analysis was for priority pollutants. If a potential problem was identified, then further testing on the eight individual systems would be warranted in order to determine the source of the problem. **(CLW 613).** LANTDIV did not share these results (Jennings Lab) with MCBCL until June 1982. **(CLW 613).** There were no indications that the sample was preserved with ice in order to protect the sample for analysis. Furthermore, Supervisory Base Chemist, Elizabeth Betz questioned how the sample was compiled and whether the volume of the sample was weighted in relation to the eight different systems aboard the base. **(CLW 590, CLW 613 & CLW 3667).**

(Note: VOCs are volatile. If they were not preserved with ice, or if there is a significant delay in sampling, then the test results indicating the presence of VOCs would be lowered and unreliable. Furthermore, samples can be easily altered by shaking the samples and then opening the caps or by leaving caps loose or off all together. VOCs are quick to volatize and convert to a gaseous state thus quickly disappearing from a sample with no trace that they had been there in the first place.)

- **Oct 30 1980 --**The results from Jennings Laboratories indicated that the Volatile Organic Compounds were detected in the composite sample collected 1 Oct. 1980. Trichloroethylene, dichlororethylene and vinyl chloride are among the 11 contaminants detected in the water. No further testing is performed despite the presence of these compounds in the water. **(CLW 430).**

- **Oct 30 1980 --**The U.S. Army lab (USAEHA) from Fort McPherson conducted water testing for TTHMs on samples taken from the Hadnot Point water distribution system. USAEHA Army Laboratory Service Chief, William Neal, warned Navy officials with a hand written caption on the bottom of the lab results: "**Water is highly contaminated with low molecular weight halogenated hydrocarbons.** Strong interference in the region of ChCl2BR. Cannot determine the value of that compound." No action was taken in regard to this warning. **(CLW 436).**

November 18 1980— While grading the parking lot of the former Naval Field Research Lab (Bldg Pt-37), workers discovered Strontium 90 Beta Buttons and at least 7 cases of Radium 226 reflectors buried in the area. The building was formerly used by the lab to conduct radioactive experimentation on dogs from 1947 through 1976. The radioactive materials along with several radioactive animal corpses were removed from the site by Naval personnel from Port Huenneme California. A total of 499 radioactive Beta buttons were discovered at the site along with a former incinerator ash dump site. **(Cercla 648).**

December 18 1980— USAEHA Army Laboratory Services Chief, William Neal, again warned Camp Lejeune Marine Corps Base that there was a problem with the Hadnot Point TTHM samples. He handwrote on the report: "**Heavy Organic interference** at CHCL2BR. **You need to analyze for chlorinated organics** by GC/MS." **(CLW 438).** These samples were taken from the Hadnot water treatment plant pump, the Naval Hospital Emergency room sink, buildings 1202, 65 and FC-530. No action was taken in regard to this warning. **(CLW 5800).**

February 9 1981—USAEHA Army Laboratory Services Chief, William Neal, again warned Camp Lejeune Marine Corps that there was a problem with the Hadnot Point TTHM samples. He handwrites on the report: "**You need to analyze for chlorinated organics by GC/MS**." The ChCl2BR column was filled in with question marks and "heavy interference" was written over the column. No action was taken in regard to this warning. **(CLW 441).**

March 6 1981 – Military Construction Data for project number LE201M, repair of POL (Hadnot Point Fuel Farm) facilities for Camp Lejeune. $537,200 allocated to clean and repair the petroleum/oil/lubricant tanks, perform vaccum tests, sandblasting and required repairs. The project also included the installation of high level alarms, reworked dikes and for the piping and valves to be replaced. The projected cited deterioration leakage problems and potential violation of environmental and safety concerns will continue if work is not completed. **(Cercla 96).** See PDF page 17.

- **March 9 1981 --** USAEHA Army Laboratory Services Chief, William Neal, again warned Camp Lejeune Marine Corps that there was a problem with the Hadnot Point TTHM samples. He writes on the report: "**Water is highly contaminated with other chlorinated hydrocarbons (solvents)!**" **(CLW 443).** No apparent action was taken by Marine Corps Base Camp Lejeune on this or any of these warnings for Hadnot Point. The TTHM reports continue to show indications of interference in the areas previously identified but the warnings from Lab Services Chief Neal cease at this point.
- **March 12 1981 --** Base Maintenance Officer receives copy of Base Order 5100.13B concerning the Safe Disposal of Contaminants of Hazardous Wastes from the Director of the NREA division, Julian Wooten. **(CLW 5996).**
- **March 31 1981** – Base Supervisory chemist Elizabeth was instructed by LANTDIV to obtain water samples from the Rifle Range Chemical dump in order to determine Hazardous waste characteristics. Soil samples from around the dump were also taken for the same reason. **(CLW 3667).** The results were returned on 7 April 1981. A variety of contaminants were found in the test wells and pools of water including: Toluene at 242 ppb, Carbon Tetrachloride 3560 ppb, dichloroethylene 122 ppb, chloroform 15,520 ppb and methylene chloride at 20,460 ppb in the various tested areas. **(CLW 3675).** The results of this test were thought to be in error. Mr. Wallmeyer cited possible errors in sampling technique or a problem with the containers as the probable cause. **(Cercla 376).** NavFacEngCom scheduled Jerry Wallmeyer to visit the base and assist Ms. Betz in the collection of a second sample. **(CLW 3685).**

April 10 1981 – Jerry Wallmeyer arrives from LANTDIV and assists Base Supervisory Chemist Betz in collecting additional water samples from the chemical dump. Samples were also taken from the finished water at the Rifle Range Water treatment plant and supporting wells. This plant was in close proximity to the chemical dump. **(CLW 3685).** The samples were delivered by Jerry Wallmeyer to Jennings lab on 13 April. The results were released on 20 April and showed much lower readings on the contaminants than what was seen on 30 March. However, Methylene chloride, trichloroethylene and chloroform were present in the raw water wells for the Rifle Range water treatment plant. The water treatment plant tested 17ppb Chloroform and 3 ppb Methyene Chloride. **(CLW 3678 + CLW 3679).** Betz advises in a memo to Danny Sharpe that she felt the lower samples from the 10 April readings could be because of a difference in the sampling procedures, bottles used, faulty pumps and possibly the weather. Betz noted that on the day of the test in March, there was rain. Rainfall in this area would cause movement of contaminants in the ground as the water percolates to the aquifer. Furthermore, Betz advised that the well pumps used in the 10 April samples were faulty and they experienced problems in suction and obtaining water flow. All of these factors could explain the lower readings of 10 April 1980. **(CLW 3714).**

May 8 1981—LantNavFacEngCom letter 114:JGW 6280 of 8 May 1981 to Commanding General Camp Lejeune Marine Corps base attention to Assistant Chief of Staff, facilities. Mr. Wallmeyer advised Camp Lejeune that the second round of sampling showed a greatly reduced amount of organic contaminants. He advised a third round of sampling will take place in May and at that point a report will be made with interpretations and findings. **(Cercla 376)**. On 20 May, Paul Rakowski from NavFacEngCom arrived at the base for the third round of sampling. Elizabeth Betz noted in a 26 May Memorandum for the record, the weather was dry and that one of the sample sites was low in water and another was dried up entirely. There were no problems with the wells on this sample. Mr. Rakowski collected a composite sample at the water treatment plant. The composite sample was taken from standing water in the tank. There were no notes on how long the water had been standing in the tank. Ms. Betz recorded on two different occasions that the samples were not preserved in ice at the recommendation of Mr.

Rakowski. **(CLW 3735).** The results for the 20 May testing once again show lowered amounts of the contaminants. The raw and treated water at the Rifle Range water treatment plant was contaminated with chloroform, methyl chloride, and dichlororethane at reduced levels. **(CLW 3755).**

Jun 8 1981 – MCBCL advises the EPA that DDT was discharged at DRMO lot 203, possibly in significant amounts. The base also advised that lot 203 would be subjected to an intense study by Naval Energy and Environmental and Support Activity (NEESA) in FY 1982. **(CLW 6004).**

- **Jun 23 1981** -- The Hadnot Point TTHM tests show signs of elevated CHCL3 and CHCL2BR as in earlier reports but there was no written warnings from Lab Services Chief Neal. **(CLW 446).**

July 21, 1981 – Jerry Wallmeyer from LANTDIV calls Elizabeth Betz to inquire on who ran and what procedures were used in the TTHM analysis for Hadnot Point and MCAS New River. He also confirmed that the Rifle Range system will be collected as well. Mr. Wallmeyer specifically requested that at the Rifle Range: one sample be taken where the raw water enters the plant while the wells are pumping, one sample from the treated tap water at the plant, two from mid points in the distribution line, and then the final sample from the furthest point away from the plant. **(CLW 5791).**

- **July 31 1981 –** Letter from J.R. Bailey NavFacEngCom to MCBCL concerning suspected chemical dump in the rifle ranger area. The letter provides an analysis of the ground water, surface water and potable waters. **(CLW 3757).**
    1. Mr. Bailey recommended no further action to be taken concerning the TTHM or organic problem at the Rifle Range water system at that time. Mr. Bailey then stated that MCBCL was scheduled for an Initial Assessment Study for the NACIP program to begin in FY-82. Mr. Bailey advised that the information in his letter and the TTHM monitoring program will be utilized by the Initial Assessment Study (IAS) team
    2. The results of the analysis should be passed to local and state officials.
    3. The letter and the accompanying enclosures did not contain any of the March readings taken by Elizabeth Betz. These results were dismissed as invalid due to a suspected contamination of the containers and improper sampling techniques.
    4. Rifle Range well RR-97, which tested positive for organic contamination, should not be used. Preference should be given to using wells RR-45 and RR-47 because of lower levels of organic contamination found in their samples.
    5. Suggested No Action Response Levels (SNARLS) recommendations from the EPA concerning PCE and TCE are given to the base. They include recommendations for one day, ten day and long term SNARLS. The long terms Snarl for PCE was 20 ppb and TCE was 75ppb.
    6. USAEHA TTHM sampling/analysis was expanded to include the Rifle Range water distribution system. (The TTHM lab reports for the Rifle Range are missing).

August 27 1981 -- Commanding General MCBCL, Major General Cooper advised Charles Rundgren at N.C. State Division of Health Services that based on laboratory analyses, the Rifle Range water system met current drinking water standards. There was no mention of the organic chemical contamination found in the Rifle Range water distribution system. The data from the 30 March testing indicating high levels of contaminants was left out of the letter to the state. General Cooper advised the base will continue to monitor the water system on a monthly basis. The letter also advised the state that the base was scheduled to undergo and Initial Assessment Study (IAS) in FY 1982 to identify assess and control contamination at the base. **(CLW 6124).**

September 1981—The USAEHA Army Lab at Fort McPherson experienced equipment problems which result in a large back log of samples. Their analysis for TTHMs in the Hadnot Point and New River Systems ceased after September 1981. However, the Rifle Range TTHM testing continued at the request of the base. **(CLW 468).**

- **Sep 10 1981** – Memorandum to the Commanding General from the Base Maintenance Officer. TTHMs at the Rifle Range and Hadnot Point water distribution systems tested below the MCL for TTHMs but MCAS

New River exceeded the TTHM standards in three of the six months tested. Col. Mount advises NavFacEngCom recommended no further testing for other chemicals at the Rifle Range until the NACIP study was completed. **(Cercla 301).**

December 4 1981– August TTHM analysis for Hadnot Point Complete. USAEHA Laboratory Services Chief wrote "**interference on this peak**" in the CHCL2BR column but there was no written warning as on prior analytical test results. **(CLW 5740).**

- **Dec 8 1981 –** Letter from Commanding General to Commandant of the Marine Corps concerning pollution abatement related to past Hazardous Material disposal aboard MCBCL. The letter advised that the Commanding General of MCBCL was concerned the NACIP study would not address the Rifle Range situation in a timely manner and this may result in an adverse public reaction and or controversy. The General requested guidance from HQMC in this matter. The base proposed a course of action to accelerate assessment and corrective action for the chemical landfill site. **(CLW 5816).**
- **Dec 18 1981** – Letter from NEESA to NavFacEngCom concerning NACIP at Camp Lejeune. The letter outlines the detailed of the NACIP program. The first phase of the study was called the Initial Assessment study (IAS). The purpose of the IAS was to identify potential hazardous waste sites and evaluate them for a possible confirmation study. According to enclosure the confirmation study would proceed only if (page A-11) **(Cercla 2042).**

  1. Sufficient evidence exists to suspect that contaminated disposal sites exist, and that
  2. The Contamination presents **a definite danger** to (a) the health of civilians in nearby communities or installation personnel or (b) the environment within or outside the installation. (note, please see how this initial wording changed in the final report listed in April 1983).

- **Dec 30 1981** – In response to the Defense Environmental Quality Program Policy Memorandum (DEQPPM) 80-6, the Department of the Navy developed the Naval Assessment and Control of Institutional Pollutants (NACIP) Program. The purpose of this program was to identify, investigate, assess, characterize, the release of hazardous substances, and to reduce the risk to human health and the environment from past waste disposal operations and hazardous material spills at Navy/Marine Corps activities. Previously, base environmental issues were handled by Utilities, Energy and Environmental Division, LANTDIV NavFacEngCom in Norfolk Virginia. The NACIP program management plan was given to the base. This plan states the Initial Assessment Study (IAS) will collect and evaluate all evidence which indicates the existence of pollutants which may have contaminated a site or pose an imminent health hazard for people located on or off the installation. **(Cercla 2042)**.

January 14 1982 – NACIP (Naval Assessment and Control of Installation Pollutants) Initial Assessment Study ("IAS") begins at Camp Lejeune. The intent of this study was to identify, asses, and control contamination of the environment from past operations. Water Air and Research of Gainesville, Florida was selected to perform the Initial Assessment Study. The base was instructed to provide the use of a photocopying facility to duplicate records. The NACIP team was granted permission to review base records in order to provide information on past operations, environmental contamination, and industrial processes. **(CLW 455).**

February 5 1982 – Letter from LANTDIV to NAVFACENGCOM dated 05 Feb 1982, MCAS New River was above TTHM limits based on the 1980-81 characterization study. The Rifle Range and Hadnot Point systems were within standards. **(CLW 458).** Camp Lejeune was notified that the NACIP IAS team was scheduled to visit Camp Lejeune in March 1982. **(CLW 470 & CLW 477).**

March 17&18 1982— Base Chemist, Ms. Betz, Jerry Wallmeyer, LANTDIV, and NACIP members visited the suspected chemical dump to collect samples from rifle range test wells. Jerry Wallmeyer requested to be provided with rainfall totals for the area. Samples were also taken from potable wells servicing the Rifle Range water system. **(CLW 488).** Test results from Jennings Lab indicated Rifle Range Dump test wells and potable RR well #97 were still contaminated with VOCs. PCB was also reported in the test well samples. Samples were hand delivered by Mr.

Wallmeyer from NavFacEngCom. The analysis was performed two days after collection and no indications were given that the samples were preserved in ice to ensure accuracy. **(CLW 487 + Cercla 373).**

- **March 1982 –** Wallace Eakes of NEESA contacts prior administrators of the Chemical Dump and determines that chemicals such as PCBS, TCE, DDT and others buried at the site. During the course of his investigation, Mr. Eakes noted that there were reports of a chemical mist on foggy mornings. One notation was concerning an incident where a heavy equipment operator reported choking after he disturbed the ground while digging a firebreak. The operator reported a white mist and abandoned his equipment after he began to choke. **(Cercla 226)**.
- **March 4 1982**– The EPA issues an Advanced Notice of Proposed Rulemaking concerning Volatile Organic Compounds in the water. The purpose of the ANPRM was to initiate discussion on the issue of VOCs in drinking water and to develop alternatives to deal with the problem. **(CLW 3804).**
- **March 14-21 1982** – Report from Wallace Eakes of LantDiv concerning the IAS at Camp Lejeune. Mr. Eakes noted that the IAS discovered about 70+ disposal sites but stated most sites were minor and not significant. The Commanding General expressed a concern about the Rifle Range because of the chemical dump. Jerry Wallmeyer of LantDiv held a briefing for the Assistant Chief of Staff, Facilities Col. Millice. In this briefing, Mr. Wallmeyer outlined the IAS findings at the Rifle Range Chemical Dump. **(Cercla 274).**
    1. The Rifle Range Dump Operated between 1955-1977.
    2. Trichloroethylene, PCP, PCBs, Chlordane, DDT were some of the items discovered at the site. .
    3. The IAS scientist believed at the time that the underground water flow for the site was toward the New River and should not enter the potable water wells at the Rifle Range. (Note, the range's wells were tested in 1981 and found to be contaminated with VOCs and other chemicals. It is unclear if these findings were revealed to the IAS team.)
- **March 23 1982** – IAS Exit Briefing held aboard Camp Lejeune. The exit briefing noted good co-operation with Camp Lejeune personnel. Seventy sites were discovered. Of these sites, the Chemical landfill at the Rifle Range, The fuel farm on Hadnot Point, the Fuel Farm at MCAS, The Camp Geiger Dump, The New River Mercury Dump and building 712 (the base daycare center) were noted as significant. The report noted that the findings concerning building 712 were a shock to all involved in the study. Mr. Eakes recommended the following course of action for the daycare. "Since this may pose a health threat to the children at the daycare, preventive medicine should be involved." Mr. Eakes noted that he and Colonel Mount then visited the Navy medical officer, Commander Lachapelle and briefed him on the situation. According to Mr. Eakes, "Commander Lachapelle agreed to take air and soil samples in the area **under the guise of a normal health survey.**" **(Cercla 274).** The samples were taken in June of 1982 by the Navy Environmental Health Center. Their tests revealed no detectable contamination in the building. **(Cercla 268).**
- **March 25 1982** – Base Chemist Betz and Gaines Huneycutt visited Lot 203 and take a composite soil sample after DDT laden barrels were reported to have been found at the lot. **(CLW 3867).** This lot was located adjacent to HP water supply well #651.

April 2 1982– Dave Goodwin of LANTDIV called Elizabeth Betz and requested additional samples to be taken at the Rifle Range WTP and the supply wells for the range. **(CLW 3845).**

- **April 8 1982** – The EPA in accordance with the CERCLA Act (Superfund) of 1980, requested MCBCL to complete a set of forms to supply the EPA with information on hazardous waste sites at MCBCL. **(Cercla 2053).** The request was forwarded to HQMC for review and it was decided that the base can not provide the requested information until the NACIP site evaluation is available in September 1982. **(Cercla 2054).**
- **April 16 1982–** Dave Goodwin of LANTDIV called Elizabeth Betz and requested another re-sampling of the Rifle Range WTP and the supply wells for the range. **(CLW 3865).**
- **April 15 1982–** the State of North Carolina granted permits for the construction of two new supply wells to be installed for use in the Rifle Range water treatment system. **(CLW 517).**
- **April 19 1982–** The base began obtaining water samples from all eight water distribution systems for TTHM analysis to be performed by Grainger Lab. **(CLW 537).**

May 5 1982. – MCBCL letter to Commandant Marine Corps dated 5 May 1982. Col. Millice advised HQMC that the base can not comply with the 23 April 1982 EPA request for potential hazardous waste inspection reports until the NACIP IAS was completed. **(CLW 3853).**

- **May 6, 1982–** Mike Hargett of Grainger Labs called Elizabeth Betz to inform her that they had found the synthetic organic cleaning solvents tetrachloroethylene and trichloroethylene in samples sent from the Tarawa Terrace and Hadnot Point water distribution systems. **(CLW 542).** Mrs. Betz then informed Danny Sharpe, Supervisory Ecologist, of Grainger's findings and then passed the findings up the chain of command, I.E. Deputy Base Maintenance Officer. **(CLW 5179).**
- **May 14, 1982.** – Elizabeth Betz was summoned to Lt. Col Fritzgerald's office in order to brief Col Millice and Lt Col. Fritzgerald on the April TTHM analysis from Grainger labs. In her memorandum for the record, Betz Advises, "it appeared to me that they had not been informed about the findings (PCE and TCE in the finished water for TT and HP water distribution systems). **I didn't inform them.**" **(CLW 553 + CLW 5179).**
- **May 17-24, 1982. –** Additional TTHM samples are taken for Camp Lejeune (including the TT and HP water distribution systems). Ms. Betz requested that all results be held until they have all of the results. Ms. Betz also informed Grainger Labs that some of the samples had problems with the caps and air bubbles but they were marked such. **(CLW 550 + CLW 554).**
- **May 26 1982. –** The Commanding Officer for the Occupational and Preventive Medicine Service, Naval Regional Medical Center, aboard Camp Lejeune was advised in writing that pesticides were found in the soil around the former pest control shop in high quantities. In 1966, this shop was converted into an on base daycare center. The soil samples were taken from in and around the center including the fenced play area. **(Cercla 2055).**
- **May 26 - 28 1982.** – Mike Hargett from Grainger Labs called to inform Ms. Betz that the cap liners used in some of the May samples were "messed up". The lab agreed to take additional samples and new containers were sent. These samples were recollected on 27 and 28 May 1982 and mailed to Grainger Labs. **(CLW 561).** One of these samples was from a sink at the Naval Hospital on Hospital Point. Bruce Babson of Grainger lab was able to quantify this reading at 1,400 ppb TCE.

June 4-9 1982 – Mike Hargett confirmed his 27 May phone conversation in writing with Elizabeth Betz. He also informed Ms. Betz that the solvent peaks which were reported in his previous report were still present but the comparison with duplicate samples (the ones with the cap issues from May 17-24) indicated poor repeatability. **(CLW 564).** The May 26-28 sample analysis was completed on June 9th. **(CLW 566).**

- **June 14 1982. –** Jacksonville Daily News reported toxic pesticides found in soil at Camp Lejeune's sitter service facility (building 712). **(CLW 572).**
- **June 22 1982 –** Draft Initial Assessment Study for Camp Lejeune. **(Cercla 332).**

1. PDF Page 23 of 171. Potable wells at the base are usually deep, but due to voids in the confining layer, this carries some risk. Also, heavy demands for water at times produce an overall decline of pressure in the semi-confined aquifer. Therefore, contaminants can migrate: (1) laterally to surface water and (2) vertically through gaps in the confining layer.
2. PDF Page 43 of 171. Conclusions point number 5 states that the water table is highly susceptible to contamination from hazardous waste disposal practices. This conclusion does not appear in the 1983 Final IAS Report.
3. PDF Page 46 of 171.The detection of pollutants in groundwater samples is generally conclusive evidence , negative results for a limited number of samples does not prove that pollutants are not and/or will not be present.
4. PDF Page 103 of 171. Solvent Usage. This section described solvent usage aboard the base. The report indicated that large amounts of solvents were used throughout the history of the base. These operations were used at operations scattered throughout the base and control of waste was difficult. This section of the draft IAS was omitted in the Final IAS report.
5. PDF Page 52 of 17. The IAS draft recommended that HP well 602 be sampled because it was located 1,100 feet from and down gradient of the Hadnot Point Fuel Farm. The well was also identified as an active pumping well.

The draft IAS report reads that Recommendations for the next phase of the NACIP program, a Confirmation Study, is based on the findings of an IAS. A Confirmation Study is conducted only if an IAS Concludes that:

1. Sufficient evidence exists to suspect that an installation is contaminated; and
2. The contamination presents a definite damage to (a) the health of civilians in adjoining communities or personnel within the base fence line or (b) the environment within or outside the installation.

If these criteria are not met, no further studies will be conducted under the NACIP program. As explained in this report, a Confirmation Study at MCB Camp Lejeune is warranted. The criteria and conclusion used to justify a Confirmation Study was significantly altered in the Final version of the report.

- **June 24 & 25 1982. –** TTHM water samples for all water systems aboard MCBCL were collected for Grainger Labs. **(CLW 570).**

July 1 1982 – Memo from J. R. Bailey NavFacEngCom to Camp Lejeune concerning composite soil sample advises Camp Lejeune to investigate sources of lead (MOGAS, AVGAS, engine oil, water battery acid, etc.) in order to reduce/eliminate contamination. It was noted the Cadmium level was approaching the hazardous waste limit and should be reduced/eliminated. Battery waste and electroplating operations were noted sources of cadmium. **(Cercla 2088).**

- **July 13 1982 --** Grainger Labs completes the analysis for the samples taken 25 June. The samples were received on 28 June.
- **July 27 1982 –** Memo from base Supervisory Chemist Elizabeth Betz to Supervisory Ecologist Danny Sharpe. Ms. Betz recommended TTHM monthly collections be reduced. However, she felt MCAS New River should continue their monthly samples due to high readings. Ms. Betz also advised Tarawa Terrace, Hadnot Point and Onslow Beach continue to be tested monthly. She also pointed out the prior commitment by the previous Commanding General to continue monthly sampling at the Rifle Range. **(CLW 583).**
- **July 27 1982 –** Memo from Julian Wooten to Base Maintenance officer regarding TTHM analysis. No problems were noted for Hadnot Point. However, Mr. Wooten advised MCAS New River was at the limit set for TTHMS and any increase would result in a violation. Mr. Wooten pointed out the remaining six water systems aboard the base do not yet require official monitoring and recommended the monthly analysis be discontinued in favor of a quarterly program. Mr. Wooten recommended the Utilities Branch evaluate alternatives for reducing TTHM content through modification of chlorination methods and procedures. **(CLW 582).**
- **July 28 1982** – Four water samples (2 from TT and 2 from Hadnot Point) taken and shipped under ice to Grainger Labs. **(CLW 584).** These samples were in addition to the TTHM samples taken for all base systems in 29 July. The purpose of the samples was to follow up on the April readings which were discussed in a phone conversation on 6 May between Elizabeth Betz and Mike Hargett of Grainger Labs. **(CLW 589).** The topic of the 6 May conversation was interference in the TTHM readings for Hadnot Point and Tarawa Terrace caused by the presence of trichloroethylene and tetrachloroethylene, aka Perclene, (synthetic organic cleaning solvents) in the samples. **(CLW 590).**
- **July 29 1982 –** Phone call between Elizabeth Betz and Linda Sewall of the Water Supply Branch State of North Carolina Department of Human Resources. They discussed TTHM reporting requirements and violation procedures. Reporting was not required until November 1982. Systems under 10,000 people were not required to report unless over TTHM limit. Ms. Betz inquired about secondary contaminants and was told the state added lead, manganese and PH. No mention was made to Ms. Sewall concerning the PCE and TCE readings in the water nor did Ms. Betz inquire into whether or not these chemicals were a concern to the state of North Carolina. **(CLW 588).**

August 5 1982 – Letter from NEESA, Port Hueneme to Camp Lejeune regarding the draft Initial Assessment Study for Camp Lejeune. The Commanding General is provided their copy of the draft IAS for review and

comments. NEESA requested that Camp Lejeune review the report for completeness, accuracy and concurrence with the recommendations contained within the report. These comments were due by 25 August. **(CLW 6332).**

- **Aug 10 1982 –** Grainger Lab sent the Commanding General of Camp Lejeune analytical results from July's sampling. Mr. Babson advised "Interference which were thought to be chlorinated hydrocarbons hindered the quantization of certain Trihalomethanes. **These appeared to be at high levels and hence more important from a health standpoint than the total Trihalomethane content. For these reasons we called the situation to the attention of Camp Lejeune personnel." (CLW 592)**

1. Tetrachloroethylene was identified as the contaminant in the Tarawa Terrace well fields. The concentrations were relatively stable during the period of examination and ranged between 76-100 ppb. (Note SNARL for extended exposures was set at 40 ppb). No action was taken.
2. The May 27 Tarawa Terrace sample was reanalyzed and found to contain 80 ppb of tetrachlororethylene.
3. Tetrachloroethylene and Trichloroethylene were identified as the contaminants in the Hadnot Point well fields. The levels in the July samples were much lower than the ones taken in May and ranged between 19 & 21 ppb. No action was taken. Note the presence of tricholorethylene in the well fields is not explained by the asbestos coated pipe theory forwarded by Elizabeth Betz. (see 19 April 1982 entry).
4. The 27 May sample for Hadnot Point was reanalyzed and found to contain 1,400 ppb of trichloroethylene. The sample was taken from the base Naval Hospital.
5. The Grainger report was forwarded to Elizabeth Betz for interpretation.

Note, Mr. Babson's conclusion that the contamination was emanating from the respective well fields for both Tarawa Terrace and Hadnot Point meant that the wells providing raw water to these two systems were contaminated.

- **Aug 18 1982 –** Memorandum for the record from Elizabeth Betz. Ms. Betz advised that Federal regulations only called for quarterly samplings. No TTHM problems were identified for the Tarawa Terrace, Hadnot Point, Montford Point, Holcomb Blvd, Courthouse Bay or Onslow Beach systems. Therefore the decision was made to reduce these systems to quarterly sampling per authorization of the Base Maintenance Officer. MCAS New River will continue testing while base utilities make changes. The Rifle Range will also continue monitoring to protect against intrusion from the Chemical Landfill. **(CLW 605).**
- **Aug 19 1982** – Memorandum for the record concerning Grainger labs letter of 10 Aug 1982. Elizabeth Betz confirmed the May 6th warning from Grainger lab. Tetrachloroethylene and Trichloroethylene were specifically identified and discussed. Betz noted TCE was used as a metal degreaser and is also used as a pesticide and fumigant. Betz suggested the PCE readings at Tarawa Terrace maybe due to coated Asbestos coated pipes in the water system. No action was recommended even though the PCE levels were above the recommended extended exposure level of 40 ppb. The 1,400 ppb reading at Hadnot Point was dismissed for no apparent reason and the conclusion was made that Hadnot Point was within the TCE SNARL. A hand written note at the bottom of the page reads,"special testing of TT & HP plants for trichloroethylene & tetrachloroethylene. Both within limits, recommend sending data to LantDiv." No further action was taken. **(CLW 606).**
- **Aug 23 1982 –** Memo from Elizabeth Betz to Danny Sharpe concerning missing test results. Betz advised she has no test results from Jennings Lab concerning the March and April 1982 water and soil samples taken from the Rifle Range, chemical landfill and Lot 203. **(CLW 3851).** These reports were provided to the base in a letter dated August 19, 1982 **(Cercla 373).**
- **Aug 25 1982 –** Letter from Commanding General MCBCL to Officer in charge Naval Energy and Environmental Support Activity regarding draft of Initial Assessment Study for NACIP. In the letter, Col. J.T. Marshall recommends the "Discussion of Trihalomethane content of Rifle Range on page 2-18 and extensive data shown on pages 6-12 through 6-18 overly stresses relationship with hazardous material/waste disposal. It is important to note that accuracy of data provided by U.S. Army laboratory is questionable. **It is recommended that TTHM information be de-emphasized throughout the report**." **(CLW 6332).**
- **Aug 1982 --** A prior version of the USMC timeline, which was posted on their website from 2004 through the Spring of 2008, asserted that at this point in time MCBCL called and notified the State of North Carolina

Department of Health that they had detected VOCs in the water. The statement was later retracted. The former official Marine Corps heading read as follows:

1. ***Aug 1982*** *-- Camp Lejeune officials were not certain whether VOCs were coming from pipes, treatment plants, or from groundwater wells. Additionally, there was concern over the accuracy of the VOC findings. Camp Lejeune remained in contact with the State of North Carolina Division of Health Services regarding the findings of VOCs at Hadnot Point and Tarawa Terrace.*
2. This supposed notification is in contradiction of known documents from the N.C Division of Environmental Health, Public Water Supply Section. In a letter dated 01/04/00, Mike Bell advised their first contact with MCBCL on the matter of VOCs in the water supply was through a telephone conversation 12 Dec 1984. He could not find any record of any reports concerning detection of VOCs from 1982-1984. **(CLW 5010)**.

September 7 1982 – Supervisory Base Chemist, Elizabeth Betz advised MCAS New River high TTHM reading was a result of TTHM formation beginning in the reservoir and continue through the water treatment system. She recommended chlorination be moved to later in the water treatment process. **(CLW 618).**

Sept 8 1982 – MCBCL filed 7 permits for new water supply wells at the base. Six of these wells were for Hadnot Point and the seventh was for the Rifle Range. **(CLW 621).**

- **Sept 8 1982** – Memorandum from Elizabeth Betz. Ms. Betz summarized the 1981 and 1982 testing at the Rifle Range water system. In her summary, Mrs. Betz noted the finished water was contaminated with organics which could be traced back to water supply well RR-97. Since then, well RR-97 was not used except for emergencies. **(CLW 635 + CLW 640). (note some of the same organics were found in TT and HP finished water but these wells were left operating, why?)**
- **Sept 23 1982 –** TTHM samples collected for Rifle Range and MCAS New River. The other water systems aboard MCBCL were not sampled. **(CLW 646).**
- **Sept 23 1982** – The State of North Carolina granted permission of the seven new wells aboard Camp Lejeune. **(CLW 651).**

October 1 1982 – Letter from Assistant Chief of Staff Facilities to Base Maintenance Officer advising NREAD Branch will be realigned so as to be under the direct supervisory control of the Assistant Chief of Staff, facilities. This realignment brings the base's laboratory (Elizabeth Betz'a and subsequent environmental testing under direct control by officers of the Marine Corps. **(CLW 3882).**

- **Oct 11 1982 –** The State of North Carolina granted permission for the 23 September application to construct a new water supply well at Tarawa Terrace (TT-23). **(CLW 682).**

November 10 1982 – NACIP IAS out-briefing held aboard MCBCL. Attendees included LantDiv personnel, base officials, Marine Corps officers, and a representative from the IAS. No minutes of this meeting have been found. **(Cercla 2058).**

- **Nov 22 1982 –** Phone call from Jerry Wallmeyer to MCBCL. Mr. Wallmeyer's called the base to notify Robert Alexander (base Environmental Engineer) and the AC/S Facilities of five new sites which were discovered since the IAS team left. These sites included possible Nuclear, biological chemical materials at the Rifle Range chemical Dump, **(Cercla 208)**.
- **Nov 29 1982 –** Quarterly TTHM collected for all systems aboard MCBCL. Note prior to this collection only the Rifle Range and MCAS New River systems were analyzed on a monthly basis after August 1982. **(CLW 688 + CLW 605).**

December 7 1982 – Base officials notify the State of North Carolina that building 712 has ceased operating as a site for the child sitting service for the base. **(Cercla 268).**

- **Dec 9 1982 –** Grainger Labs warned MCBCL the analysis of the eight water treatment systems indicated resumption of VOC interferences in the TT and Hadnot Point systems. Trichloroethylene and tetrachloroethylene were cited as the compounds that were interfering with the analysis. No action was taken. **(CLW 691).**
- **December 14 1982 –** A change order was issued for The IAS to include 2 disposal sites in their final study. The report was released four months from the date of the change order. **(Cercla 2059).** Jerry Wallmeyer of LantDiv requested Camp Lejeune's environmental Engineer, Bob Alexander, to send a message from the base to LantDiv in order to initiate the change. The sites included two areas at the Rifle Range Chemical Dump, an old sawmill located near the mess hall grease trap, twenty drums of transformer oil, two sites near TLX Owl involving pesticides and a site located near the Rifle Range where an operator burying TCE, DDT and another chemical was injured during an explosion which occurred in 1970. **(Cercla 208).**
- **Dec 13 1982 –** The State of North Carolina requested MCBCL to follow up on their July 1982 agreement concerning groundwater monitoring at the Chemical landfill. Included in the testing was a requirement for "Total Organic Halogen". **(CLW 3993).**
- **Dec 21 1982** – Elizabeth Betz called Bruce Babson to discuss a typographical error made on the last round of sampling. Mr. Babson expressed his concern to Ms. Betz over the solvents which previously interfered with prior Tarawa Terrace and Hadnot Point TTHM Samples. He advised that the PCE & TCE interference were still present in both systems. During the phone conversation Mr. Babson told Ms. Betz that the levels (TCE/PCE) at Hadnot Point had dropped for a while, however in the last sample the levels were relatively high again. The TTHM levels at MCAS New River remain just at compliance to the new standards **(CLW 698).**

January 4 1983 – Julian Wooten forwarded a request to the AC/S Facilities to have the base Environmental Engineer (Robert Alexander) look into the TTHM interference problem (PCE & TCE) at Hadnot Point and Tarawa Terrace water distribution systems. Attached to the request is the December 21st memo from Elizabeth Betz concerning her phone call with Grainger Labs and the interference caused by TCE and PCE. **(CLW 703).**

- **Jan 26 1983** – TTHM samples collected from MCAS New River and Rifle Range only. **(CLW 6402).**

February 25 1983 – Julian Wooten, Director Natural Resources and Environmental Affairs Division (NREAD) aboard MCBCL, advised the Assistant Chief of Staff, facilities that the initial one year TTHM monitoring period will end in February. He advised that MCAS New River was not in compliance with TTHM standards and requested that they initiate immediate consult with state regulatory personnel on order to achieve compliance. Mr. Wooten also recommended that the base discontinue TTHM monitoring except for MACS New River and Hadnot Point. **(CLW 6402).**

- **Feb 25 1983 –** TTHM Samples taken from all water systems aboard MCBCL and sent to Grainger Lab. **(CLW 6393).**

March 1 1983 – OIC, DSSC Letter DSSC/DRF/EDW 11333 indicated that piece meal rehabilitation of the fuel facility (Hadnot Point) would not be cost effective and recommended a major rehabilitation of the facility to include relocation of bulk loading stands, dispensing pumps, unloading area and the administration building. Excavation of and exposure of all tanks and pipes was recommended. **(Cercla 96)** See PDF page 29.

Note the fuel farm remained operational until 1989. The draft IAS recommended testing of well HP 602 as part of the confirmation study because this well was actively pumping water for Hadnot Point and located down gradient and 1,100 feet from the Hadnot Point fuel farm.

March 7 1983 – Military Construction Project Data for project LE433R, POL Truck Dispensing Units at the Hadnot Point Fuel Farm. $209,300 was allocated to provide for improvements for new truck stands, pumps, valves, piping, and pavement/oil spill controls. **(Cercla 96)** See PDF page 20.

- **March 16 1983 –** Grainger Lab completed the quarterly TTHM analysis for the water systems aboard MCBCL and once again warned that there was interference due to trichloroethylene in the Hadnot Point samples. There was no reported interference with the Tarawa Terrace samples. No action was taken. **(CLW 6393).**

- **March 30 1983 –** W. R. Price, Utility System Operator General Foreman, advised Julian Wooten that there was an inadequate water supply for Tarawa Terrace and Camp Johnson for the upcoming summer months. Mr. Price commented that well field production has diminished from what was achieved in past years. He noted that a new well (TT-25) was constructed in April 1982 at Tarawa Terrace and that a second new well was under construction (TT-23). Mr. Price further cautioned that the continual use of these wells without periodic rest could result in well failures. (note, overuse of the wells will also result in an increase draw of contaminants into the well head.) **(CLW 707).**
- **March 30 1983 –** Col J.T. Marshall, Facilities Assistant Chief of Staff, wrote State Health Director, Ronald H Levine concerning building 712, former site of the base child sitting service. He advised that Chlordane and DDT were confirmed at the mix and wash pads but that concentrations within the playground area were shown to within detection limits. Air samples taken from within the building revealed no detectable DDT, malathion, or chlordane. **(Cercla 268).**

April 1983 – Initial Assessment Study for Marine Corps Base, Camp Lejeune was published and concludes that while none of the sites posed an immediate threat to human health or the environment, further investigation was warranted at 23 of the 76 sites. There was no mention in the IAS report of any problem or dangers to the potable water systems at Hadnot Point or Tarawa Terrace. TTHM and organic solvent contamination were discussed only in reference to the Rifle Range water treatment system.

> The Final IAS report reads that Recommendations for a Confirmation Study phase of the NACIP program was based on the findings of an IAS. A Confirmation Study is recommended only if the following circumstances exist:
>
> 1. Sufficient evidence exists to suspect that the activity is contaminated; and
>
> 2. The potential contamination may present a danger to (a) the health of civilians in nearby communities or personnel within the activity fence line, (b) the environment within or outside the installation.

No further studies will be conducted under the NACIP program, if these criteria are not met. As explained in this report, a Confirmation Study at MCB Camp Lejeune is warranted. The IAS concluded that while none of the sites pose an immediate threat to human health of the environment, 22 warrant further investigation under the Navy Assessment and Control of Installation Pollutants (NACIP) program to assess potential long term impacts. A Confirmation Study is, involving actual sampling and monitoring of the 22 sites is recommended to confirm or deny the existence of the suspected contamination and to quantify the extent of any problems which may exist. **(CLW 709).**

- **April 7 1983 –** The contractor for well TT-23 certifies that the newly constructed well was constructed in accordance with the state's well construction regulations. The well was pumped tested for 24 hours on March 15th. **(TT-23 Construction logs)**. This document is in contradiction to the official Marine Corps position that this well was completed in July 1984. The Marine Corps further contends that the well was found to be contaminated upon construction and thus, never put into production. Please refer to July 1984 entry for more information.
- **April 14 1983 –** Environmental Engineering Survey for Camp Lejeune prepared by Utilities, Energy and Environmental Division, NavFacEngCom. The report covered the period in time between October through the beginning of November 1982. The purpose of the report was to identify environmental facility, environmental operation, and maintenance deficiencies. The report covered Air Pollution, Potable water, Wastewater, Oil and Hazardous Waste/Toxic Substances. At the end of the summary is a paragraph which states "Any Environmental problem that should arise between surveys or problems inadvertently omitted during the current survey should be directed to NavFacEngCom. There were no

discussions concerning Grainger lab's findings of PCE and TCE in the potable water for Camp Lejeune contained in this report **(CLW 6141).**

1. Located in the Hazardous materials section of the report is the comment that the paint and sign shop (Bldg HDP-1410) waste solvents are such as cellulose acetate thinners are poured down the sink drains. The report recommended MCB Camp Lejeune should identify and stop the disposal of waste solvents into sanitary sewers.
2. MCB Camp Lejeune should identify and stop the disposal of waste solvents into the sanitary sewers.
3. Maintenance areas #TP-448, Bldg 902 and 901 were noted areas where cleaning solvent were stored. The area lacked appropriate waste oil handling facilities and as a result of spillage the areas have become heavily contaminated with oil.
4. A used oil solvent study if presently scheduled for FY-84.
5. TTHM readings were discussed in relation to MCAS. There was no mention of the August 1982 letter from Grainger lab nor interference in Tarawa Terrace or Hadnot Point's TTHM readings due to the presence of tetrachloroethylene and trichloroethylene in the potable water.

May 10 1983 – Letter from Jerry Wallmeyer at LantDiv to MCBCL. This letter was the subject of an intensive 4 week document search that occurred at the LantDiv repository in February of 1999. **(CLW 3048 + 3049)** The letter was reportedly never found but over 33 boxes of documents were uncovered. According to a memo dated 3 April 1985, the letter was an action plan to verify the existence and extent of VOC contamination aboard MCBCL. **(CLW 1195). (note, this letter is written three years after VOCs are first detected in the potable water at MCBCL. The letter is also is one and a half years before the contaminated wells at Hadnot Point and Tarawa Terrace are shut down. Another major point of concern is this question; Why was the information concerning VOC contamination of at least two potable water systems left out of the IAS? Why did Mr. Bailey of LantDiv recommend that Rifle Range well RR-97 not be used because of organic contamination in July 1981? Why wasn't the same recommendation made concerning the organic contamination present in the Hadnot Point and Tarawa Terrace systems?)**

- **May 31 1983 –** TTHM samples taken for all eight water treatment systems aboard MCBCL. **(CLW 6380).**

June 1 1983 – Assistant Chief of Staff for Facilities, Col J.T. Marshall, sent compiled test results for inorganic chemical, corrosivity analyses, and Trihalomethanes averages to Charles Rundgren at the State of North Carolina Water Supply Branch. He did not include the original Grainger Lab reports. Instead a compiled table of the Grainger data was submitted. **(CLW 934).**

- **Jun 15 1983 –** May TTHM samples analyzed by Grainger Lab. There are no PCE/TCE interferences noted for Tarawa Terrace. The Hadnot Point results show the same interferences as in past results but there are no notations concerning where the interference originates. In past reports PCE/TCE was noted to be the source of the interference. **(CLW 6380).** No action was taken.
- **Jun 21 1983 –** Wm Larry Elmore, Environmental Engineer, Water Supply Branch State of North Carolina, sent Col. Marshall a letter in response to the 01 June 1983 letter concerning inorganic chemical, corrosivity analyses, and Trihalomethane analysis. Mr. Elmore thanked Col. Marshall for the data compilation but informed him that the State required the raw analytical data on the actual forms used by Grainger. The Grainger forms for the Trihalomethane analysis during the time period in question contain notations and warnings from Grainger Labs indicating the interference for Hadnot Point and Tarawa Terrace was the result PCE/TCE contamination. **(CLW 940).**

July 14 1983 – Letter from J.R. Bailey to CG MCBCL regarding groundwater monitoring results at the Rifle Range water distribution system. Mr. Bailey advised that the organic contamination detected in earlier testing was no longer present in the Rifle Range water distribution system. However, test wells continue to show organic contamination in the groundwater around the chemical dump. He advised the base that the organic contamination at the dump will be addressed via the NACIP Confirmation study. **(CLW 5937).**

- **Jul 15 1983 –** Col Marshall advised LantDiv the base has seen the 10 May 83 Wallmeyer letter and concurred with the scope of work detailed in the letter. He requested that Bob Alexander be contacted to set up the required meeting between base officials and the contractor performing the Confirmation Study. **(Cercla 2063).**
- **Jul 27 1983** – Samples taken for TTHM analysis from all eight systems aboard Camp Lejeune. These samples were lost in the mail. **(CLW 6377).**

August 11 1983 – The new Facilities Assistant Chief of Staff, Col. Lilley, provided the North Carolina Department of Human Resources a copy of the IAS report and advised 22 of the 76 identified sites warranted further investigation. However, none of the 22 sites were reported to pose an immediate threat to human health. **(Cercla 2004).**

- **Aug 25 1983** – Samples from all eight water systems collected for TTHM analysis by Grainger Labs. **(CLW 949).**
- **Aug 29 1983 –** Grainger report on the August 25th samples indicated that PCE and TCE was present in the water samples from Tarawa Terrace and Hadnot Point. **(CLW 952).** No action was taken.

December 1 1983 – Letter from LantDiv to MCBCL concerning contract 81-B-3849 Inspection and Testing of POL tanks. The letter provided criteria for testing and inspection of tanks base wide. **(Cercla 1235).**

See 31 May 1985 entry concerning this inspection.

- **Dec 12 1983 –** Assistant Chief of Staff for Facilities, Col Lilley responded to the 21 Jun 1983 letter from Mr. Elmore, Environmental Engineer State of North Carolina. The letter was addressed to Mr. Rundgren. Col Lilley resubmitted the TTHM complied results and two additional tables explaining the results. Col Lilley also noted that per a 30 Nov 1983 telephone conversation with Dick Caspers at the Water Supply Branch, the original Grainger lab reports were not submitted as previously requested by Mr. Elmore **(these are the reports which contained the notes and warnings from Grainger that PCE/TCE were interfering with the TTHM analysis for Hadnot Point and Tarawa Terrace)**. Col. Lilley requests that Hadnot Point be reduced from quarterly TTHM sampling to annually. (this would eliminate most of the troublesome warnings from Grainger Labs). MCAS New River remained on a quarterly testing schedule **(CLW 6348).**

- **Dec 21 1983** – Bob Alexander, Environmental Engineer MCBCL, called Arthur Mouberry N.C. State Division of Environmental Management and makes a verbal request for the construction of 55 monitoring wells aboard MCBCL. The wells were needed for the Confirmation phase of the NACIP program. **(CLW 6512 & CLW 6516).**

January 18 1984 – December TTHM samples for MCAS New River and Hadnot Point were analyzed. Interference was noted in the Hadnot Point samples but no explanation was given as in earlier reports. No action was taken. **(CLW 6362).**

- **Jan 20 1984 –** The State of N.C. granted permission for MCBCL to reduce TTHM sampling at Hadnot Point to one sample per quarter. **(CLW 977).**

February 9 1984 – Letter from Commanding General MCBCL to Commanding Officer, Field Medical Service School. AC/S facilities, Col. Lilley, advised commanding officer of the Field Medical School that Camp Johnson and Tarawa Terrace water treatment plants were to be abandoned after the expansion of the Holcomb Blvd water treatment plant. Construction was set to begin in January 1985 and completed by December 1985. **(Cercla 312).**

March 27 1984 – Charles Rundgren requests MCAS New River's sodium analysis for their water system. The request was forwarded to Camp Lejeune in April 1984. **(CLW 5333).** The results were submitted 30 April 1984. **(CLW 4133).**

April 16-18 1984 – Meeting between Confirmation study contractors and base official held aboard MCBCL to discuss scope of work, plan of action and milestones (POA&M). There are no records of the meeting other than a brief note on page 2-1 Confirmation Work and Safety Plan. **(Cercla 337).**

May 02 1984 – State granted permission for the construction of 2 new supply wells for the Hadnot Point water system. **(CLW 999).**

- **May 1984 –** Work and Safety Plan for Confirmation study. The work plan was the verification step in which the hired contractor will determine whether specific toxic and hazardous materials identified in the IAS were present in concentrations considered to be hazardous. The study will install ground water monitoring wells, sample soil, tissue, ground and surface water for contaminants. The verification step will be a general evaluation of contamination found and will serve as a basis to proceed with the Characterization step of the Confirmation Study. A draft report will be provided by August 1984 and a Final report will be provided by September 10 1984. **(Cercla 337).**

June 1984 -- EPA published proposed recommended maximum contaminant levels (RMCL) for TCE and PCE in drinking water and solicited public comment. Under the *Occurrence of VOCs in drinking water* heading, the registry reads: "VOCs are man made chemicals; their presence may indicate that a pollution incident has occurred." **(CLW 5055).**

- **June 7 1984 –** Article titled "Environmental Study kicks-off" appeared in the base newspaper The Globe. The article read that environmental engineers and scientist from ESE were going to spend six weeks drilling wells and collecting water, soil and sediment samples to determine if hazardous materials exist and/or have the potential to contaminate the environment on the base. AC/S, facilities Colonel Lilley stated "While contractor personnel will routinely wear personal protective equipment such as chemical resistant coveralls, we do not expect to expose anyone to any contaminants." The results of the survey were expected by August 1984. **(Cercla 132).**

July 1984 – Environmental Science and Engineering sampled the Hadnot Point Industrial area around the fuel farm and supply well HP-602 as part of their Confirmation investigation. Well 602 tested positive for VOCs (Benzene 380ppb, Dichloroethane 46ppb, Trans-Dichloroethene 7.8ppb, Ethylbenzene 8ppb, Trichlororfluoromethane 3 ppb, and Toluene 10ppb). **(CLW 1737 & Cercla 388).** According to Marine Corps and State of North Carolina documents, eight wells of the Tarawa Terrace distribution system were tested for VOCs in July 1984. The Marine Corps found three of these wells contaminated with TCE.

Wells tested July 1984	TT-23	TT-26	TT-25
TCE	37 ppb	3.9 ppb	trace amounts

No apparent action was taken. The analytical data sheets for all of these tests are missing. It is important to note that the USMC provided the above mentioned readings in support of their first contention that TT well # 23 (New Well) was discovered contaminated upon construction **(CLW 2982)** and never ran. The fact the analytical data sheets are missing raises skepticism to their validity. The USMC's original position changed after it was discovered that well TT-23 (New Well) was indeed fully operational by 1984 and provided water to the Tarawa Terrace water distribution system and the consumers on that system. The USMC has since revised its position and now contends that the well began operating in July 1984. However construction documents indicate that well TT-23 (New Well) was pump tested by April of 1983 **(TT-23 Construction Log)**. Ironically, a month before the wells completion, the utilities foreman for the base for the base sent a memo to the utilities directory advising him of an impending water shortage for the summer of 1983 at Tarawa Terrace **(CLW 707).** It is hard to believe that a fully operational well was left dormant until July 1984, especially in the midst of a water shortage. ATSDR requested the construction paperwork for the well's pump house and equipment. To date, the USMC has been unable to provide the requested paperwork to ATSDR.

Finally, if the test results are correct then, the presence of VOCs in the raw water supply wells should have been a clear indication that a pollution event had occurred within the groundwater aboard the base. **No explanation has been given as to why it took five to seven additional months to shut down wells HP 602, TT-23, and TT-26 after the results of these tests. (CLW 2982, CLW 5094, 87 May N.C. Site Inspection Report, ATSDR Chapter A Summary of Findings).**

July – November 1984 – According to the Work Safety Plan for the confirmation study, there were three progress reports scheduled during this time frame. The work study plan also read that ESE will routinely contact the EIC to report the project status and any adjustments to the schedule. These reports and updates are missing. **(Cercla 337).** We attempted to locate the missing data at ESE (Now called MACTEC) but we were informed that the warehouse which contained these documents burned down during the middle of the night on 7 January 1999. The cause of the fire was never conclusively determined. **(Fl Div of State Fire Marshal report # 99-0110).**

November 30 1984 – Throughout the history of the drinking water contamination, the USMC has maintained that Well HP 602 was shut down after benzene (121ppb), TCE (1,600 ppb), DCE (630ppb) and PCE (24ppb) were found in the well water. **(CLW 1054 & CLW 4971).** The figures for these results were based on a 3 December sample of well HP 602. This sample was taken after the well was taken off line on 30 November. In fact, well HP 602 was sampled four and a half months prior to the 30 November closure of well HP 602. On 6 July 1984, Well HP 602 was sampled and found to contain benzene at 380 ppb and trace amounts of solvents. This data was collected while well HP 602 was an active pumping well for the Hadnot Point water distribution system. **(Cercla 388). The incorrect data (i.e. the 3 December samples) was included in the ATSDR 1997 Public Health Assessment (withdrawn April 2009), the 2007 GAO report on Camp Lejeune and the 2009 NRC Committee report on Camp Lejeune.**

During a 1988 briefing for the Technical Review Committee, Base Environmental Engineer, Robert Alexander stated, "This well (602) in particular triggered this whole investigation. It was an active water supply well at the time, and by sampling and analyzing, we identified the presence of some of these volatile organic compounds, waste solvent, fuel derived materials. Based on that finding, Camp Lejeune initiated a self-sampling of all of these wells". When asked about what levels were present in the water, Mr. Alexander comments "It depends on where you are…This was in the…and I am speaking off the top of my head, 30 ppb (actually it was 1,600 ppb), **fairly low but still toxic enough for you that you don't want to touch the water**. **(Cercla 47).**

December 3 1984 – Well 602 and several other wells from the Hadnot Point water system were sampled by base officials and analyzed for VOCs. **(Cercla 250).**

- **Dec 4 1984** – VOCs were detected Hadnot Point water system. Samples were taken again and shipped to the lab via Federal Express. **(CLW 1054).**
- **Dec 6 1984** – Robert Alexander, base environmental engineer, returned a call to J.R. Bailey at LantDiv. Mr. Bailey informed him that benzene was found in well 602, trichloroethylene was found in wells 602,601,603 and 608 as well as the finished tap water at the treatment plant. They agreed that confirmation testing should be initiated as soon as possible on these and other nearby wells. Mr. Bailey advised that a message containing an action planning was forthcoming. Mr. Alexander briefs Assistant Chief of Staff, facilities, Col. Lilley and Lt Col. Fitzgerald later that afternoon. Mr. Alexander advised base utilities to shut down wells 601 and 608. **(Cercla 250 & CLW 5635).**

Contaminant	**Hadnot Point Raw water**	**Hadnot Point Treated water**	**601**	**602**	**603**	**608**
Benzene	0	0	0	121	0	0
Chloroform	10	16	0	0	0	0
BRCL2Mthne	6	10	0	0	0	0

TCE	46	200	207	1600	4.6	110
DCE	15	83	88	630	0	5.4
PCE	0	3.9	0	24	0	0

Readings are in PPB

- **Dec 10 1984** – December 4th samples results revealed continued VOC contamination of raw water and wells 601,602,605,608 and now wells 634, 637 and 642. **(CLW 1054).**
- **Dec 10 1984** – Robert Alexander, base Environmental Engineer, called Mike Bell, Regional Engineer, State of North Carolina and advised him VOCs have been found in the Hadnot Point water system. He stated that four wells have been shut down and further testing was underway. **(CLW 1051).**
- **Dec 12 1984** – Finished water at Hadnot Point tested and found to contain 30 PPB Chloroform. 2.3 ppb DCE and 2.3 ppb TCE. A 13 December test of raw (before treatment) Hadnot Point water did not detect any PCE/TCE/DCE in the water. **(CLW 5644).**
- **Dec 12 1984 –** Article appeared in Marine Corps news periodical, *The Globe*. The article reads: "Environmental officials are taking precautionary measures to ensure drinking water is free from possible contamination. As a result of water samples taken on 3 Dec, four wells in the Hadnot Point industrial area were found to contain some traces of organic compounds according to Base Environmental Engineer, Bob Alexander." The article goes on to read that none of the organic compounds are listed under the Safe Drinking Water Act. The article ends with a quote from Mr. Alexander, "every effort will be made to maintain the excellent quality water supply traditionally provided to residents of Camp Lejeune." **(Cercla 523).**
- **Dec 14 1984** – Hadnot Point Wells 634 and 637 were shut down after testing positive for methyl chloride. **(CLW 1647 & CLW 4546).**

January 8 1985 – NavFacEngCom quality control lab checked and verifies the validity of JTC Environmental Consultanst's findings concerning VOCs in the Hadnot Point water system. Cheryl Barnett of NavFacEngCom advised that ESE results were not yet available and a letter from LantDiv will follow soon. **(CLW 1103).**

Jan 8 1985 – Enclosure from unknown letter to Bob Alexander. The enclosure detailed the proposed action plan to characterize the VOC problem at the base.

1. The 7 remaining WTP plants were to be surveyed for VOCs.
2. The 100 wells on base, including the ones previously identified, were to be sampled.
3. NavFacEngCom will evaluate alternatives to respond to these tests.
4. ESE (Confirmation study contractor) will be tasked to define the scope and solution to the problem (VOCs in the drinking water). **(CLW 1105).**

- **Jan 11 1985** – Ground water quality standards were revised in the Federal Registry. **(CLW 1106).**
- **Jan 14 1985** – Environmental Science and Engineering (ESE) released Evaluation of Data from First Round of Verification Sample Collection and Analysis. This report was the raw data from the first round of sampling (June to November 1984) and was provided to the Marine Corps during the time the base was scrambling to determine the extent of the potable water contamination. **(Cercla 388).**
  1. The data presented in this report consist of analytical results for samples of surface and ground waters, sediments, soils and fish tissue collected at 21 sites of potential contamination.
  2. 55 shallow ground water monitoring wells and 75 samples were collected.
  3. 17 existing potable water supply wells were sampled.
  4. On the margins for site 1 (page 2-8) there was a handwritten note that reads, "It appears that we do not have a true up gradient well. How will we explain away contamination in up gradient wells or should we expand well field now or in characterization."
  5. On the margins of site 6 (2-18) aka Lot 201 and 203 there is a handwritten note that reads, "sample 3 potable water wells on Piney Green Road for pesticides, dioxin and contaminants found in

MCBCL work. And on Holcomb Blvd. It was not clear if well HP-651 was one of these wells discussed.

6. On the margin for site 22 (2-34) aka Hadnot Point Industrial Area Tank Farm there was a handwritten note that reads, "We must send them our (1141's) report on well data, what it means and what wells to keep shut down.
7. PDF Page 48. Hadnot Point Fuel Farm Site 22. "of **extreme importance** is the high level of benzene (380ppb) detected on the sample collected from deep water supply well no. 602. This benzene concentration far exceeds the 10 minus 5 human health risk limit of 6.6 ppb; therefore the **use of this well should be discontinued immediately."**
8. PDF page 52 Hadnot Point Fuel Farm Site 22. **"The absence of contamination at well 22GW2 indicates that the migration pathway is deep, not shallow."**

Note, the Confirmation Study contractor's monthly progress reports (August, October, September and November) a draft report and an evaluation of data scheduled for completion by September 1984 in the May 1984 Work and Safety plan for the Confirmation study are missing. The reports fall in between the actual sampling of well HP-602 on 6 July 1984 and the January release of this report. **(Cercla 388.)**

- **Jan 16 1985 –** All operating wells for Holcomb Blvd. and Hadnot Point sampled. **(CLW 4546).**
- **Jan 23 1985** – Tarawa Terrace water treatment system sampled. Analysis completed by lab on Feb 5 1985. **(CLW 5570).**
- **Jan 27 1985** – The water treatment plant operator on duty received 2 phone calls from residents of Paradise Point and Berkley Manor. They complained of a fuel smell in the finished water. The operator collected samples form the areas affected and when he returned the source of the fuel odor was located at the Holcomb Blvd WTP plant. The plant was taken off line and the 1 million gallon reservoir was drained. Holcomb Blvd WTP is off line from Jan 27th through Feb 4th. **(CLW 4514).** During this time, finished water was provided to the areas served by Holcomb Blvd from Hadnot Point WTP by means of a bypass valve connecting the two plants together. **(CLW 4546).**
- **Jan 31 1985 –** The state of North Carolina takes water samples from Holcomb Blvd WTP to determine whether or not gasoline was still present in the system. There was no gasoline found. Instead high levels of TCE were discovered throughout the Holcomb Blvd water distribution system. **(CLW 4514 + 29 Jan NC State report).**

Analysis completed 2/4/85	**Hadnot Point WTP** From Distribution Pump	**Holcomb Blvd WTP** Bottom of Reservoir	**Holcomb Blvd WTP** Middle of Reservoir	**Holcomb Blvd WTP** Top of Reservoir	**Tank S-803** Fire Hydrant
TCE Reading	900.02 ppb	24.2 ppb	25.8 ppb	26.8 ppb	849.0 ppb
DCE Reading	321.3 ppb	7.4 ppb	7.8 ppb	7.6 ppb	340.0 ppb
Location	**Berkley Manor Elem.** Bldg 5400	**MOQ 2212 Cold Water** Chief of Staff residence	**MOQ 2212 Hot Water** Chief of Staff residence	**Building PP 2600** Firehouse	**Tank S-2323** Water Storage Tank
TCE Reading	1148.4 ppb	724.7 ppb	612.9 ppb	890.9 ppb	407.1 ppb
DCE Reading	406.6 ppb	249.4 ppb	201.2 ppb	332.4 ppb	159.0 ppb
Location	**Married officer's Qtrs** Fire Hydrant MOQ 2204	**Tank SLCH 4004** Storage Tank	**Bldg BM 5677**	**Bldg BM5531**	
TCE Reading	839.6 ppb	318.3 ppb	981.3 ppb	905.5 ppb	

DCE Reading	307.6 ppb	107.5 ppb	368.7 ppb	335.0 ppb

The above table was compiled from **CLW 4515** + **CLW 5371**.

Feb 5 1985 – Tarawa Terrace Wells TT-26 and TT-23 (New Well) tested positive for VOCs.

Samples taken 1/25/85	**PCE**	**TCE**	**DCE**	**Vinyl Chloride**
TT-26	1580 ppb	57 ppb	92 ppb	27 ppb
TT-23	132 ppb	5.8 ppb	11 ppb	0 ppb

(CLW 5587, CLW 5571 & CLW 5593).

- **Feb 4 1985 –** Holcomb Blvd WTP is reactivated. Holcomb Blvd and Hadnot Point began flushing their systems. **(CLW 4546).**
- **Feb 4 1985 –** Samples taken from Hadnot Point wells January 16th are returned from the JTC lab. Several new wells were discovered to be contaminated with VOCs. Well 651 tested positive for extreme amounts of VOCs in the water. This well was located immediately adjacent to the base junkyard. Well HP-651 was shut down **(CLW 5594 & CLW 4546).**

Samples Taken 1/27/05	**PCE**	**TCE**	**DCE**	**Vinyl Chloride**
Well 634 (out of service)	10 ppb	1,300 ppb	700 ppb	6.8 ppb
Well 651	386 ppb	3,200 ppb	3,400 ppb	655 ppb
Well 652		5.5 ppb		
Well 653		1.5 ppb		
Well 601 (Out of service)		26 ppb	8 ppb	

- **Feb 7 1985 –** Areas in the Holcomb Blvd WDS including Berkley Manor Elementary school were tested again for VOCs. The results were received the same day. VOCs were present but in lower concentrations. Berkley manor Elementary tested 135.1 PPB TCE. **(CLW 5369).**
- **Feb 8 1985 –** Wells 652 and 653 on Hadnot Point and Wells TT-26 and TT -23 (New Well) at Tarawa Terrace were shut down. **(CLW 5095).**
- **Feb 22 1985 –** Hadnot Point WTP tested 1 ppb TCE in finished water. **(CLW 4533).**
- **Feb 27 1985** – Three hour meeting between Rick Shiver, State of North Carolina, and Robert Alexander, Base Environmental Engineer. Mr. Shiver's brief notes indicated that he agreed to send copies of N.C. State regulations to Mr. Alexander. Mr. Alexander turned over copies of Hadnot Point data. **(CLW 4558).**
- **Feb 27 1985 –** Letter addressed to Jerry Hardwood at LantDiv from Calgon Activated Carbon Division. The letter was a follow up to a phone conversation concerning cost estimates for emergency potable water treatment systems for Trichloroethylene contamination at 1,600 – 2,000 PPB. Costs associated with this measure:
  1. Delivery, installation and supervision/training, $60-70,000
  2. Fee after first month, $ 5,000
  3. Extra Truckloads of filtrasorb and disposal, $ 21,000
  4. Shipment is within 24-48 hours of client authorization. **(CLW 6520).**

March 1 1985 – Action Brief concerning alternatives for providing water to Tarawa Terrace area. Because of the closure of wells TT-26 and TT-23, base officials realized that there will be an estimated shortage of 300,000 gallons per day of water at Tarawa Terrace beginning immediately and lasting through out the summer months. A list of 7 alternatives was proposed by Facilities Assistant Chief of Staff, Col. Lilley. **(CLW 1129)**

1. Install a new well at Tarawa Terrace. The problem with a newer well is that water in significant quantities is difficult to locate at Tarawa Terrace. Estimate cost: $80,000.
2. Transport water via tanker trucks from other water plants. However, the logistic of hauling 300,000 gallons per day was questionable. Estimated cost: $2,000 per day.
3. Tap into existing City of Jacksonville water line under Lejeune Blvd. There was a concern that the city may not be able to provide the water and there was a fear that the city would request reciprocating favors to the Marine Corps. Estimated cost: Unknown.
4. Change existing contract for Holcomb Blvd to construct a water line to Tarawa Terrace immediately. Estimated cost: Unknown.
5. Construct 8" water line from Brewster Blvd to Tarawa Terrace across the railroad trestle on Northeast Creek. It was unknown if the state would approve the measure. Estimated Cost: $75,000.
6. Modify Tarawa Terrace plant to include aeration or granular activated carbon unit capable of removing VOCs. A time objection was made concerning installation but this is contrary to the letter from Calgon, please see entry dated 27 Feb 1985. Estimated Cost: $300,000.
7. **Re-activate and use contaminated well(s) that have been closed if required to maintain adequate water levels and pressure**. Lack of Federal MCLs for VOCs or restrictions for using VOC contaminated water is used to justify this measure. However, the brief also reads "the potential health hazards must be weighed against the need and cost of providing water from other sources." (Please see entry for BUMED 6240.3B and 6240.3C and note the language concerning chemicals in the water: "substances which may have a deleterious (harmful) physiological effect or for which the physiological effects are not known, shall not be introduced into the water system in a manner which would permit them to reach the consumer." Estimated Cost: zero.

Alternative 5 was selected for implementation but the estimated completion date was 5 June 1985 and state approval for the project was needed. There was no discussion concerning how to provide for the impending water shortage during while the auxiliary line was under construction. **(CLW 1129).**

Note Alternative 7 was used as a way to supply drinking water for Tarawa Terrace until 1 March 1987.

- **March 5 1985 –** Action Brief concerning Tarawa Terrace water supply system; use of contaminated well TT-23. The decision was made by the Commanding General of MCBCL to study the use of contaminated wells at Tarawa Terrace during the time needed to complete the auxiliary raw water line to Tarawa Terrace. The State of N.C. also needed data on the levels of VOCs in the finished water. A procedure to use TT-23 (New Well) was agreed upon. TT-23 new well was operated and then closed pending the laboratory results. **(CLW 4618).**

- **Mar 8 1985 –** Well HP651 retested and was again found to be positive for extreme levels of VOCs. Hadnot Point WTP and Holcomb Blvd WTP plants also test positive for VOCs. The water storage tank at Tarawa Terrace also tested positive for VOCs. **(CLW 5237).**

Samples Taken 2/5/85	**PCE**	**TCE**	**DCE**	**Vinyl Chloride**
Well 651	400 ppb	18,900 ppb	7,580 ppb	168 ppb
Hadnot Point WTP	7.5 ppb	429 ppb	150 ppb	2.9 ppb
Holcomb Blvd WTP		2.8 ppb		
Holcomb Blvd WTP		1.5 ppb		
Tarawa Terr STT 39A (water storage Tank)	215 ppb	8 ppb	12 ppb	

- **Mar 11 1985 –** One hour and 35 minute meeting between Robert Alexander and Rick Shiver. According to Mr. Shiver's notes, much of the meeting was spent discussing N.C. State regulations. Mr. Alexander advised Mr. Shiver that Tarawa Terrace will have a water shortfall during the summer months due to the closed wells. A pipeline connecting Hadnot Point was discussed. **(CLW 4558).**
- **Mar 11 1985 –** Letter from Julian Wooten (NREAD) to Col. Lilley, Asst. Chief of Staff Facilities, concerning standards for certain types of VOCs found in drinking water wells. A call was made to Paul Hubbell of

LantDiv concerning the subject of the letter. Mr. Hubbell recommended that the base not attempt to contact individual states for information and that he would request the information from the EPA. **(CLW 1179).**

- **Mar 14 1985 –** Lab results from samples taken from Tarawa Terrace water distribution system using TT-23 new well. **(CLW 5362).**

Samples taken 3/11 & 3/12	**Plant prior to TT-23**	**TT-23**	**TT-23**	**Plant before Reservoir** 24 Hrs after TT-23	**Plant after Reservoir** 24 Hrs after TT-23
PCE	0 ppb	14.9 ppb	40.6 ppb	21.3 ppb	6.6 ppb

- **Mar 21 1985 –** Meeting held at MCBCL to discuss Tarawa Terrace water supply shortages and alternatives to address the problem. It was agreed that with two wells closed at the Tarawa Terrace water supply system, there was insufficient water to meet summertime demand. **(CLW 6596)**
  1. Tests indicate that if New Well is operated and blended, then detectable levels of PCE will exist in finished Tarawa Terrace water.
  2. Estimated levels are between 10-20 ppb.
  3. The auxiliary water line was expected to be completed by 01 June 1985.
  4. Limited data on health effects and containment levels. (See **BUMED 6240.3C**)
  5. The use of blended well water appears to not pose any extreme health threat to TT residents. Use will be on a contingency basis.

- **Mar 22 1985** – Meeting between Rick Shiver and Robert Alexander concerning Tarawa Terrace. Mr. Alexander advised Mr. Shiver that Tarawa Terrace will experience a 300,000 gallon/day shortfall in production due to closed wells. He explained the proposal for an emergency pipeline from Holcomb Blvd. Mr. Shiver reviewed current North Carolina groundwater standards with Mr. Alexander. **(CLW 4558).**
- **Mar 26 1985** –Holcomb Blvd water treatment plant expansion (contract 81-1644). The state expresses concern that contract was awarded prior to their approval and advised that they will need to review proposed well sites for approval. **(CLW 4727).**

April 3 1985 – Message from Commanding General Camp Lejeune to LantDiv. This memo was a status report on the situation at Camp Lejeune. The General's staff advises that 10 wells have been found to be contaminated and were closed. Water production has not been affected in 7 of the bases 8 water treatment plants. However, Tarawa Terrace was identified as a problem. The General's staff advises an auxiliary line will be installed to feed water into Tarawa Terrace. The base will also proceed with procuring equipment to enable local testing of VOCs in the water. The Holcomb Blvd WTP was slated to be immediately expanded, as recommended in an April 1979 report, to provide finished water to the Tarawa Terrace and Montford Point areas. The message also referenced Jerry Wallmeyer's letter 10 May 1983 letter and the need to expedite the study into the magnitude of the VOC contamination at Camp Lejeune. The message concluded with a request for LantDiv to provide milestones by 22 April 1985. **(CLW 1195).**

- **April 8 1985 –** Memo from Assistant Chief of Staff Facilities, to Base Maintenance Officer concerning changes in the State of N.C. groundwater classification and water quality standards. The standards were not yet in force. However, the new rules will mean that the water used aboard MCBCL will be required to be free of man made substances (i.e. VOC's). **(CLW 4733).**
- **April 8 1985 –** NavFacEngCom message to CG MCBCL. NavFacEngCom advised MCBCL that Environmental Science & Engineering (NACIP Confirmation study contractor) will review collected data and additional field sampling/laboratory data to develop interim monitoring recommendations for raw water aboard MCBCL. The contract was expected in July 1985. **(CLW 1239).**
- **April 18 1985 –** State of North Carolina grants permission to install 14 new supply wells aboard MCBCL. **(CLW 1189).**
- **April 22 & 23 1985 –** TT-23 (New Well) operated and used to supply water to residents of Tarawa Terrace. VOCs were detected in the water after each run of the well. **(CLW 1194).**

- **April 22 1985 –** Message from Commanding General MCBCL to LantDiv concerning inspection of POL tanks and a request for field investigation. The General's staff advises, in an attached report from ESE, that extremely high levels of VOCs (Benzene, Ethylbenzene, Toulene) and lead were detected in a monitoring well around the tank farm area. A request to expedite field investigations and testing to characterize the extent of the fuel leakage. **(CLW 1235).**
- **April 26 1985 –** Internal memo from Base Maintenance Officer to Assistant Chief of Staff Facilities, regarding water shortages in Tarawa Terrace area. Mr. Luttrell advises the AC/S that without water conversation measures or approval to turn on the VOC contaminated well this weekend, an anticipated water shortage for Tarawa Terrace will occur. Mr. Luttrell also requested that the AC/S and not NREAD make the operational decision on whether or not to use the contaminated well to supply water to the residents of Tarawa Terrace water system. Without higher guidance, he advised that he will not authorize the operation of well TT-23, even if it results in water outages. **(CLW 4768).**
- **April 28 and 29 1985** – TT-23 (new well) operated to provide water for the Tarawa Terrace water distribution system. **(CLW 4769).**
- **April 30 1985 –** Notice to residents of Tarawa Terrace from Commanding General MCBCL, Major General L.H. Buehl. The General informed the residence of Tarawa Terrace that 2 supply wells for the Tarawa Terrace water supply system were taken off line because "minute (trace)" amounts of several organic chemicals were detected in the water. He advised that there are no federal or state regulations for a safe level of these compounds but he did order the closure of these wells for all but emergency use (i.e. fire or when domestic supply is threatened). Nothing was said about the levels found or when the contamination was discovered or their possible health effects. The General went on to advise the residents served by the Tarawa Terrace system, that water consumption must be reduced. He outlined the water restrictions needed to be followed in order to conserve water. **(CLW 1191).**
- **April 30 1985 –** Memo titled Instructions to Operators at Tarawa Terrace. The guidance requested by Mr. Luttrell on 26 April was put into writing. The operators were advised to call the Command Duty Officer when the reservoir reaches 6 feet. The officer will provide approval and instructions to operate well TT-23. Well TT-26 was never to be operated. **(CLW 4771).**

May 9 1985 – Message from Commanding General MCBCL to CMC Washington. The message was an update on the situation at Camp Lejeune. The CG advises: 10 wells were now off line for VOC contamination, construction was underway for an auxiliary pipe line to Tarawa Terrace, conservation measures were in place, and that a press release had been issued. This message also confirms that TT-23 (New Well) had been used on three separate occasions even though the well itself was contaminated. The CG also states that additional monitoring and location of the source of the VOCs was being pursued by the NACIP program. Further testing was scheduled to begin in July. Finally, the CG states that the base will have a limited VOC analysis capability starting in June via the water quality control lab located aboard the base. **(CLW 1237).**

- **May 10 1985** – News article *Jacksonville Daily News.* The article reads that a Navy study has found volatile chemicals in 10 deep water wells at MCBCL. "According to the memo from chief of staff, facilities, no federal or state regulations mandate an unacceptable level of these organic chemicals." Gunnery Sgt. John Simmons from Lejeune's Joint Public Affairs Office (JPAO) also advised that he had no information on whether the well water was dangerous to humans. The article also reads that the 10 wells were all taken off line in December instead of December through February as what actually occurred. Finally, Gunnery Sgt. Simmons stated that Tarawa Terrace can barely meet the current demand for water and that an auxiliary line was being constructed. Nothing was said about the continued operation of contaminated well TT-23 at Tarawa Terrace to prevent system shut down due to the ongoing water shortages. **(CLW 4784).**
- **May 11 1985** – Article in *Wilmington Morning Star.* This article contains surprisingly more detail than the *Jacksonville Daily News* article. The article quoted Lee Mittelstadt, public information officer for the Solid and Hazardous Waste Management Brach of the N.C. Dept. of Human Resources. She listed some of the chemicals found by name and stated "(they) are toxic". Because the base was a federal reservation, the Marine Corps can not be fined by the state. Chuck Rundgren, head of the state Water Supply Branch, advised that "he did not think Camp Lejeune residents need to worry about getting bad drinking water. I think we kind of caught it right at the beginning." The article ends with Gunnery Sgt. Simmons

reiterating the same half truth and half incorrect information given to the *Jacksonville Daily News*. **(CLW 4784).**

- **May 13 1985 –** Letter from the State of North Carolina Water Supply Branch to Commanding General MCBCL regarding new well sites for Hadnot Point and Holcomb Blvd. Mr. J. Fred Hill advised the base that he agreed with the suggestion to analyze and evaluate samples from these sites for VOC contamination prior to construction of any new wells. **(CLW 1198).**
- **May 15 1985 –** State of North Carolina Staff report concerning the application of 15 NCAC 2L to the well contamination problem at Camp Lejeune. The report was written by Rick Shiver, Regional Hydrologist Wilmington Regional Office. Mr. Shiver recommended that a notice of violation be sent to the base. The state will also work to identify the sources of contamination for the Tarawa Terrace wells. **(CLW 4773).**
- **May 15 1985** – Letter from Regional Director State of North Carolina Dept of Natural Resources and Community Development to commanding General MCBCL regarding Notice of Violation Groundwater Classification and Standards, Source of Groundwater Pollution Camp Lejeune Marine Corps Base. The letter was addressed to Major General Buehl personally. Mr. Wakild advised the General that according to the NACIP study, the following organic contaminants were found in 10 potable water wells aboard base: tetrachloroethylene, trichloroethylene, dichlororethylene, methylene chloride, vinyl chloride, dichloroethane, benzene, toluene and dichlororbenzene. He also advised that all of the impacted wells were exposed to the tertiary sand aquifer between 50 and 200 feet below land surface. Mr. Wakild notified the General that the base was in violation of 15 NCAC 2L and therefore the Marine Corps must submit a plan of action within 30 days. The plan of action also required the Marine Corps to identify the source of the contamination, to define the scope of the contamination, future impacts of the contamination and proposals to remediate and restore the polluted ground waters. Finally, a specific schedule defining scope and time necessary to completed the above plan of action. Rick Shiver was names as a point of contact for the State. **(CLW 1200).**
- **May 24 1985** – Commanding General MCBCL letter to NavFacEngCom regarding Confirmation Study second round sampling. NavFacEngCom was advised that the CG MCBCL has seen the comments on the first round of sampling results and additional concerns from the base have been attached. The General stated that the second round of sampling will be within one mile of each contaminated well both on and off base. Finally, there was a request to add a new contamination site located at MCAS New River to the NACIP study. **(CLW 1205).**
- **May 31 1985** – Meeting held at MCBCL concerning Drinking water quality maintenance study group. There are no minutes of the meeting. The occurrence of the meeting was documented by a brief agenda. **(CLW 6574).**
- **May 31 1985** – Message from Commanding General MCBCL to NavFacEngCom concerning contract 81-B-3849, Inspection and Testing of POL tanks. The Commanding General requested a field investigation for the fuel farm at Hadnot point after extremely high levels of benzene, ethybenzene, toluene and lead were detected in ground water monitoring wells in the fuel farm area. The testing performed during the July 1984 Confirmation study indicated the leakage of large quantities of fuel at the site. **(Cercla 1235).**

June 5 1985 – Memorandum for the Commanding General Camp Lejeune from Chief of Staff concerning potential contamination of the City of Jacksonville by Marine Corps Base Camp Lejeune. In response to the General's concern, the chief of staff contacted Mr. Shiver of the state Division of Environmental Management and Camp Lejeune Natural Resources Director, Julian Wooten. Together they advised the general that Camp Lejeune is in no way affecting the aquifer presently being used by the city of Jacksonville. **(Cercla 205).**

- **Jun 6 1985 –** NREAD internal memo to director NREAD. Danny Sharpe reminded Julian Wooten that MCO P11000.8B requires CMC notification of any written notices of violation of pollution control laws (i.e. The 15 May violation letter from the state of North Carolina). **(CLW 4802).**

- **Jun 19 1985 –** Phone call from United States Geological Survey (USGS) Raleigh office to Robert Alexander, MCBCL, concerning the use of the USGS to study the ground water at the base. A meeting time was noted for July 23rd. **(CLW 1231).**
- **Jun 21 1985** – Letter from Rick Shiver to Col R.A. Tiebout Assistant Chief of Staff, Facilities. Mr. Shiver advised the Colonel of the test results for the 9 April sampling of Tarawa Terrace Wells TT-25, TT-26

and New Well (TT-23). Well TT-26 was found to contain 630 ppb PCE, 18 ppb TCE and 1.4 ppb DCE. **(CLW 1244).**

- **Jun 21 1985 –** Memorandum to the file. Gold S Johnson Jr, Utilities Director, noted that per report from Danny Sharpe, MCAS New River was in violation of TTHM levels. Furthermore, the violation was not reported to the State and that this would probably result in yet another violation. **(CLW 1241).**
- **Jun 25 1985 –** Meeting 25 Jun 1985 to discuss TTHM levels at MCAS New River/Camp Geiger. The meeting was to discuss the probable upcoming violation letter from the State. Potential solutions were identified and it was agreed to wait until Fred Hill from the State arrived on base 28 Jun 1985. **(CLW 1280).**
- **Jun 28 1985 –** Fred Hill arrives at MCBCL and inspected the proposed new wells sites requested on 13 May for the Holcomb Blvd expansion and the TTHM problems at the base. The following measures were adopted in an attempt to manage the TTHM problem at the base:
  1. Effective 2 July 1985, finished water samples will be tested by NREAD and an independent lab.
  2. After testing, pre-chlorination will be discontinued for a one week trial.
  3. On 9 July 1985, samples will be taken and analyzed.
  4. Effective immediately, wells with the lowest potential for developing TTHM's will be run to the extent possible.
  5. After one week trial, data gathered will be studied for further action.
  6. Vendors will be contacted to obtain cost of replacing chlorination (a cause for TTHM) as a pretreatment for drinking water. **(CLW 1256 + CLW 5905).**

July 2 1985 – Pre-chlorination discontinued at MCAS New River in an attempt to manage the air station's TTHM problem. **(CLW 1267).**

- **July 16 1985 –** A meeting was held at Camp Lejeune to discuss the TTHM and salt water intrusion problems at MCAS New River. They identify salt water as a source of bromide which was needed to form bromoform (A TTHM). Base officials noted studies have established the station's water supply was subject to salt water intrusion and a corresponding increase in formation of bromoform. **(CLW 1267).**
- **July 18 1985 –** Golf Course watering Memo from Base Maintenance Officer to Assistant Chief of Staff, Facilities. The memo identifies that the utilities department was using treated water to water the base's 2 golf courses but due to poor record keeping and inadequate schematics, they did not know if it was Hadnot Point or Holcomb Blvd water. It was also noted that while the sprinklers were in operation, a considerable amount of water was being used. Mr. Price also advised that they really needed to pursue this. The AC/S facilities agreed in a hand written note on the page and comments "This is a good idea and we should push hard." The routing slip also contains a note from Mr. Price "Lets proceed with vigor and get info from PWO. **(CLW 1264 + CLW 1278). This memo is significant in that the Holcomb Blvd water system was later identified as the source for the treated water used at the golf courses. Each course can require anywhere from 300,000 to 500,000 gallons of water per day to maintain the vegetation. At the time of the contamination, Holcomb Blvd only had a 1.7 million storage capacity for treated water. To make up for the corresponding shortage of treated water, water was frequently transferred from the contaminated Hadnot Point system to Holcomb Blvd for use by the family housing areas served by that system. This was a subject of a recent CAP (Community Assistance Panel) meeting held at the CDC in Atlanta April 17th 2008.**
- **July 18 1985 –** 7 wells were closed at MCAS New River due to high chloride contamination.
- **July 18 1985 –** Memorandum from Rick Shiver to Perry Nelson of the Exploratory Unit. Mr. Shiver advises the contamination problem for Tarawa Terrace may originate from two facilities, ABC Cleaners and Glam-O-Rama cleaners. He recommended Glam-O-Rama be tested first because it was located directly across the street from the contaminated well TT-26. Mr. Shiver states the well was about 100 feet deep and was probably exposed to the (semi-confined) Yorktown Aquifer. If no plume exists for Glam-O-Rama, then ABC will be tested. Mr. Shiver ominously observes that the Tarawa Terrace well fields were down gradient to ABC and Glam-O-Rama cleaners. In the memo he wrote, "down-gradient well sites are a problem at ABC!" **(CLW 4810).**
- **Jul 23 1985 –** Meeting between Bob Alexander, base officials and representatives of the USGS concerning Camp Lejeune's ground water resources. Base officials requested the USGS to perform and appraisal of the ground water resources and geo-hydrology of MCBCL. **(CLW 4816).**

- **Jul 25 1985 –** Letter from Assistant Chief of Staff, Facilities, Col. R. A. Tiebout to Mr. Wakild of the N.C. Department of Natural Resources. The letter was the response to the State's May 19th Notice of Violation letter. Col. Tiebout enclosed a plan of action and advised that the anticipated start date will be September 1985. The projected completion dates for the characterization step and feasibility study were set for September and December 1986. **(CLW 1269).**
- **Jul 30 1985 –** Memorandum for request for assistance at Tarawa Terrace. Rick Shiver documents a request made to Oscar Howard to assist with the preliminary drilling around ABC Cleaners. This drilling may isolate the source of the contamination and will provide the data needed for further investigations by the State. **(CLW 4815).**

August 1 1985 – Phone conversation between Elizabeth Betz and Mike Bell conceming test well readings for the proposed new wells slated for use in the Holcomb Blvd expansion project. VOC readings related to gasoline were picked up in the test samples. Mr. Bell advised that the sampling procedure of using a gas powered air blower to clear the test wells may have contaminated the samples or caused any VOCs present to be volatized from the water. He recommended further sampling without a gas powered air compressor. Danny Sharpe hand wrote on the memo that he needed a recommendation on whether or not to sample or proceed with the drilling of the well. There is no documented response to his question. **(CLW 5912).**

- **Aug 6 1985 –** Memorandum to the Commanding General MCBCL from Chief of Staff concerning TTHMs at MCAS New River. Seven wells containing high levels of the compounds needed to produce TTHMs were taken off line. Saltwater intrusion was the cause of the problems with these seven wells. The closure of these wells brought the Air Station within compliance of the TTHM standard. A sample Public Health memo was prepared in case the state requires notification to consumers. **(CLW 1294).**
- **Aug 14 1985** – USGS Proposal to appraise the ground water resources aboard MCBCL. The USGS identifies that MCBCL derives its water primarily from the ground water and was one of the largest entities in the state which withdraws ground water (8 million gallons per day). Operational and population growth aboard the base have increased the amount of waste generated by the base. As a result of this growth, significant amounts of waste containing hazardous waste and toxic organic compounds have been disposed of or spilled aboard MCBCL. **(CLW 4819).** "Most of the disposal and spill sites are directly underlain by sand and lack natural or synthetic barriers to contain the waste and prevent them from moving downward into the groundwater. Consequently, some of the waste have infiltrated to the water table and contaminated some of the ground water in the shallow and supply aquifers." **(CLW 4820).**
- **Aug 16 1985** – Letter from AC/S Facilities, Col. Tiebout to Charles Rundgren, Water Supply Branch State of N.C. Col. Tiebout reported to the state the measures taken to reduce TTHMs at MCAS New River. The measures include the closure of 7 wells with high chloride levels. **(CLW 6339).**
- **Aug 29 1985** – Letter from Commanding General MCBCL to Commandant of the Marine Corps concerning the US Geological Survey study of the ground water aquifer aboard MCBCL. The CG advised the Commandant that growing water supply needs coupled with the threat of present and future contamination of existing wells by disposed waste, brackish water and saline water has prompted his command to request the U.S. Geological Survey to study the geo-hydrology of the base and environs. The study was needed to determine what groundwater practices are needed to reduce further contamination and help assure water supply needs were met for the operation of the base. The Commandant was requested to review and provide comments/concurrence with the proposed study. **(CLW 6578)**

September 5 1985 – Letter from Commanding Officer Naval Hospital Camp Lejeune to Commanding General MCBCL regarding Environmental Heath Inspection Results for buildings SH-8 and SG-14. The inspection performed Occupational and Preventive Medicine Department revealed that the well and chlorination system used to provide water to these 2 buildings was inadequate causing the water to be susceptible to bacteriological contamination. The situation was first discovered in March 1984 and has continued to exist. The recommendation was made to close the water supply for these building for use as a drinking source. The outlets were secured with the warning signs posted appropriately. **(CLW 4849).**

- **Sept 15 1985 –** News article from *Raleigh News and Observer*. The article discusses in depth the environmental transgressions that occurred at the base and is in contrast to the articles which appeared in cities closer to the base. For example, the reporter cites that gallons of mercury, enough to poison 184,000 acres of foot deep water was drained from radar equipment and buried at the base. The article is a testimony to a public relations campaign waged by the base to minimize the magnitude of the problem aboard MCBCL. **(CLW 4855).**
  1. Base Environmental Engineer, Robert Alexander is directly quoted in the article as saying: "the 22 sites are not considered dangerous because only trace amounts of contaminants have been found to have escaped from the dumps. People had not been directly exposed to pollutants."
  2. Charles Rundgren, head of N.C. water supply branch is also quoted in the article as saying, "the wells had been plugged shortly after they became contaminated. The amount of chemicals found were not a threat to people who had been drinking the water during the short period. The water would not cause someone to become ill from drinking it, but ill effects could result from long term exposure."
  3. H. Lee Mittelstadt, Spokeswoman for the state Solid and Hazardous Waste Branch states that N.C. officials felt Camp Lejeune was taking adequate steps to protect people from possible exposure to the contaminants by closing the wells. The contamination from the 22 sites was a potential problem but not immediate threat because the locations were known and monitoring could detect future problems.
  4. Base AC/S Facilities Col. R.A. Tiebout "characterized all actions taken so far (closing wells, relocating the daycare and extensive testing) as precautionary measures. "
  5. Wayne Mathis of the EPA states that he could not speculate on the potential risks of each site. The risk would depend on whether the material was in a stable location and whether people had access to the chemicals." "You wouldn't want kids out there digging in the soil."
- **Sept 17 1985** – Meeting aboard Camp Lejeune MCB between Col. R.A. Tiebout, Robert Alexander, Base Environmental Engineer, and Mr. Elston from the State of North Carolina. No known records exist of the meeting except for a notation in a letter. The notation reads that at this meeting, the State made a formal request for the technical data collected from step 1A of the NACIP program be transmitted to the Division of Environmental Management for review and interpretation. **(CLW 4859).**

October 7 1985 – Letter from Rick Shiver, N.C. Regional Hydrologist, to Brigadier General J.B. Knotts, Commanding General MCBCL. The letter was a written follow up to the request for the technical data from the NACIP Step 1A (Confirmation Study). Mr. Shiver advised. "the data is requested in lieu of the formal report, since some portions of this report are believed to be in error." **(CLW 4859).**

- **Oct 8 1985** – Letter from Chuck Wakild to Perry Neslon concerning Larry Fitzpatrick's inquiry into the groundwater problems aboard MCBCL. Mr. Wakild enclosed a report from Rick Shiver titled "An Assessment of Groundwater Pollution Sources at Camp Lejeune" for his review. Mr. Wakild warned that considerable public attention will be focused on this problem and how we (the State of N.C.) deals with it. **(CLW 1297).**
- **Oct 8 1985 –** Report from Rick Shiver titled: An Assessment of Groundwater Pollution Sources at Camp Lejeune. The report is an overview of the NACIP program and an assessment of the State's authority to participate in the groundwater remedial projects aboard the base. Mr. Shiver noted the results of the July 1984 ground water studies were documented in a report provided to the Marine Corps in February 1985. He also stated in the letter that: "As the Marine Corps disagrees with the conclusions in this report, it will not release a copy of it to any outside agency. Recently, however, the Marine Corps did agree to provide DEM copies of the technical data for review and interpretation." **(CLW 4871-73).** To date this report (mentioned in this document by Rick Shiver) has not been released to the public despite several Congressional requests to produce this report. In April of 2008, Congressman Allen Boyd (D Florida) again requested the missing report and was given **Cercla document #388.** Titled "Evaluation of Data From First Round of Verification Sample Collection and Analysis." This document is the technical data given to the State and later the EPA and not the report cited by Mr. Shiver in the above mentioned text.
- **Oct 8 1985 –** Memorandum from Elizabeth Betz regarding the State's request for recently received laboratory reports. Betz advised Danny Sharpe that there are several problems concerning the data she was preparing for the State. Ms. Betz advised that the distilled water analysis was done as part of the

laboratory control and was not required to be submitted to the state. However, the data was part of the report which the state was requesting. Betz also advised that the base had not performed the required sodium analysis of the water. The test and report were overdue. **(CLW 5344)**

- **Oct 25 1985 –** Letter from Perry Nelson to Larry Fitzpatrick of the State of North Carolina. Mr. Shiver's report and supporting documents concerning Camp Lejeune were forwarded to Mr. Fitzpatrick. Mr. Nelson advised that the State was seeking a legal opinion from the Attorney General to address the State's authority concerning enforcement of remedial actions aboard Camp Lejeune. **(CLW 4869).**
- **October 28 1985 –** Test results for wells TT-26, TT-25 and now TT -25 showed continued contamination with VOCs. **(CLW 5476).**
- **Oct 29 1985 –** Memorandum from Perry Nelson to Jim Mulligan, Mick Noland and Chuck Wakild concerning Managing Groundwater Contamination on Military Installations. Mr. Nelson advised the Groundwater Section Chief or higher authority will handle all communications with military installations concerning clean up and future investigations. **(CLW 4867).**
- **Oct 29 1985 –** Letter from Base AC/S Facilities, Col. Tiebout to Charles Rundgren, Water Supply Branch State of N.C. concerning TTHM and inorganic chemical analysis. The sodium analysis turned into to the state was outdated and no mention was made as to when the State will perform the required test. **(CLW 5337).**
- **Oct 31 1985** – Letter from AC/S Facilities Col. Tiebout to Rick Shiver, State of North Carolina, concerning the request for technical data letter dated 7 October 1985. Col Tiebout advised in the letter that the enclosure includes a site plan for each site, water quality data and water level data. The enclosure is **Cercla document # 388**, "Evaluation of Data from First Round of Verification Sample Collection and Analysis. **(CLW 4900).**
- **Oct 31 1985 –** Phone Call from Anne Rosecrance JTC Lab to Elizabeth Betz. Ms. Rosecrance advised that JTC did not detect any VOCs in well TT-25. Hadnot Point and Tarawa Terrace treated water samples were also negative for VOCs. **(CLW 4901).** Ms. Betz then sent a memo to Base Director NREAD recommending that sampling for VOCs be limited to finished water and completed on a weekly basis.

November 1 1985 – Conference aboard Camp Lejeune between base officials and EPA representatives Wayne Mathis and Jim Holdaway concerning findings of the NACIP study and the groundwater contamination aboard the base. The minutes of the meeting were preserved by Rick Shiver in his handwritten notes. **(CLW 4903).**

1. The EPA "advises" Camp Lejeune to identify specific sources which resulted in the contamination of the community water supply. It was pointed out to the EPA representatives that the EPA has no authority to require action aboard MCBCL.
2. Mr. Holdaway countered and advises recent changes in RCRA permitted the EPA to address environmental issues after 08 Nov 1984 for inactive sites on base.
3. Mr. Mathis advised existing data substantiates a risk to a population thus triggering consideration for MCBCL to be included in the National Priority List (NPL). The Department of Defense was responsible for implementing CERCLA on behalf of military installations.
4. Base officials refused to release the initial Confirmation Report from January 1985 and countered that the report is erroneous. The EPA representatives explain that the Confirmation Study initial report will be the basis for listing MCBCL on the NPL. Base Environmental Engineer Robert Alexander resisted this idea and advised the report is erroneous. Mr. Shiver adds a postscript note to himself, "CERCLA imposes punitive measures only for failure to report and concealment of data. "
5. Mr. Shiver explains the State's participation in the investigation for the source of the PCE contamination in Tarawa Terrace's wells. The State had already identified the source but this information was not released at this meeting.
6. Another post script note indicated that emergency water line became active 01 Jun 85.

- **Nov 6 1985 –** Memorandum to the Commanding General MCBCL from Chief of Staff Facilities, Col. Tiebout advised the CG that TT wells 23 and 26 remain contaminated and well TT-25 was detected to contain PCE at 0.43 ppb. The state recommended more sampling be done to determine if contamination was migrating to this well. Col. Tiebout also advises no VOCs have been detected in the finished drinking water since July 1985. Finally, the Colonel advises that the State has identified ABC One Hour Cleaners to be the source of contamination at Tarawa Terrace. **(CLW 1338).**

- **Nov 13 1985 –** Base Order 11011.2 Encroachment control. As directed by orders from HQMC, the CG of MCBCL implements an Encroachment Control program/board aboard MCBCL. Encroachment was defined as any action planned or executed in the vicinity of Camp Lejeune or normal areas of operation which inhibits, curtails, or posses the potential to impede or adversely affect mission performance aboard MCBCL. Competition for potable water assets and environmental/natural resource conversation legislation were identified as examples of encroachment as used within the order. **(CLW 1342).**
- **Nov 18 1985 –** Letter from Arthur Linton of the EPA addressed to Commander Atlantic Division NavFacEngCom to the attention of J.R. Bailey, Environmental Quality Branch. This letter highlights some of the EPA's input and concerns with the NACIP study.
  1. Phase 1 reports are heavily dependent on the use of indicator parameters to make conclusive decisions about the releases of pollutants at a given location.
  2. The EPA recommends that samples of groundwater and/or surface water be collected and analyzed from each site.
  3. The NACIP study should contain sufficient geologic and hydrological data to support conclusions regarding the hydro-geology and drainage of a general area. This data will also be necessary for a valid assessment of probable direction of possible horizontal and/or vertical migration of contaminants.
  4. When studies indicate a significant potential release or detect migration of pollutants, then data should be collected that address potential risks of exposure to human populations.
  5. **Based in information and preliminary data presented by MCBCL staff during the 1 Nov 1985 meeting, the USEPA believes that there is sufficient data indicating potential extensive contamination of groundwater in several areas of Camp Lejeune to warrant immediate consideration of this site (MCBCL) for inclusion on the National Priority List (NPL) due to the potential risk to a population dependent on potable ground water as is the case aboard MCBCL.**
- **19 Nov 1985—**The Hadnot Point water treatment plant tested positive for benzene at 2,500ppb, 2,600ppn methylene chloride and 100ppb toluene. The analytical data sheets for these results are missing. There is also a notation "not representative" written above the entry. **(CLW 1406)**.

December 1 1985 – Summary report on Groundwater Investigation to Define Source(s) of Tetrachloroethylene that have Contaminated Three Community Water Supply Wells at Tarawa Terrace MCBCL by Rick Shiver. **(CLW 4826).**

1. April through September 1985, the State of North Carolina Department of Natural Resources and Community Development (DNCRD) conducted a groundwater investigation to define the source of PCE present in 3 wells for the Tarawa Terrace water system aboard MCBCL.
2. The hydro-geology underneath Tarawa Terrace indicates that the territory sand system is unconfined (and thus would easily allow movement of contaminants in the groundwater).
3. The cone of depression for a well in the Tarawa Terrace well field system attains a radius of 900-1500 feet. ABC Dry Cleaners is about 970 feet from well TT-26. Glam-O-Rama cleaner is roughly 125 feet from well TT-26. The cone of depression created by pumping acts like a funnel that focuses water and contamination towards the well. Over pumping of a well or well field will accelerate this process.
4. In September 1985 well TT-25 showed VOC contamination.
5. The report concludes that the interpretation of the data suggests the PCE plume originates from the septic tank-soil absorption system at ABC One Hour Dry Cleaners. The study results did not implicate Glam-O-Rama as a significant source of PCE contamination.
6. The EPA was contacted by the state and provided a copy of Shiver's findings.

- **10 Dec 1985 –** The Hadnot Point water treatment plant tested positive for benzene at 38ppb, 10ppb toluene. The analytical data sheets for these results are missing. **(CLW 1406)**.

- **Dec 19 1985 –** Letter from Chuck Wakild to Perry Nelson concerning Rick Shiver's report on ABC One Hour Cleaners. Mr. Wakild recommended the state send ABC a Notice of Violation of N.C. State's groundwater statutes. **(CLW 4906).**

January 24 1986 – Internal memo from Director NREAD to Facilities, Environmental Engineer, facilities Dept, and Base Maintenance Officer MCBCL concerning analysis of drinking water systems aboard Camp Lejeune. Periodic readings of Benzene were dismissed as a quality control problem and were arbitrarily discounted. Shortages in NREAD personnel have affected the base laboratory's ability to produce certified data concerning the water systems aboard the base. Finally, Mr. Wooten advised that careful planning will be required to offset additional cost. The base will hold actual sampling (for water systems aboard base) to the essential minimum which protects public health and provides compliance to standards, laws and regulations. The last paragraph contains an instruction to the base Environmental Engineer but the instructions are blacked out. **(CLW 1406).**

February 3 1986 – Letter from Arthur Linton of the EPA to Commander Atlantic Division NavFacEngCom attention J.R. Bailey regarding 01 Nov 85 meeting aboard MCBCL and Confirmation study. In particular, the quality of the water obtained from wells in the Hadnot Point area of MCBCL were reviewed at some length. **(CLW 5430).**

1. Mr. Linton advises that during the discussions on 01 Nov 85, Mr. Mathis and Mr. Holdaway became aware that there was evidence derived from sampling in 1983 or1984 of diffuse contamination of ground water with unspecified organic substances **(this information given to the EPA is in direct contradiction to documentation which indicated that at least 2 potable water systems contained tetrachlororethylene and trichloroethylene as early as October 1980).**
2. The EPA representatives were led to believe that the contamination did not extend to the treated potable water. "It was also established that there was no contamination detected in treated potable water distributed at Camp Lejeune." **Once again this is in contradiction of known documentation that named and confirmed the presence of specific VOCs in raw AND treated potable water aboard MCBCL.**
3. At the recommendation of Mr. Mathis, Mr. Linton made a formal request for the NACIP Confirmation Study results for monitoring wells and potable wells so they can insure there was no contamination present in the Camp Lejeune water supply. This report was denied to the EPA because that the data was still in raw form and under review. Mr. Linton countered by requesting a brief on the report and copy of the report when it was published.
4. Mr. Linton finishes by informing Mr. Bailey that the EPA was concerned that a potential for human exposure to hazardous substances and hazardous waste via the Camp Lejeune water supply may exist due to the presence of such materials in ground water in the general vicinity of the potable well field. The existence of such a potential exposure would warrant immediate consideration for MCBCL for inclusion on the National Priority List. **At the time that this letter was written, the EPA was unaware that a documented contamination event had already occurred involving the treated potable water systems aboard MCBCL.**

- **Feb 6 1986 –** Letter from J.R Bailey to Arthur Linton of the EPA regarding the 18 Nov 85 EPA letter. Mr. Bailey concurs with all of the points outlined in Mr. Linton's letter with the sole exception of the last point regarding the National Priority List. Mr. Bailey disagreed with the idea of including MCBCL on the NPL and stated that the NPL will result in slower cleanup time and delays. He informed Mr. Linton the state and public were being kept informed through meetings with the state and news paper articles in local papers (Please see entries dated 12 Dec 84, 10 May & 11 May 1985, and 15 Sep 85.) Mr. Bailey stated that they were proceeding as quick as possible with the confirmation study and will provide the report as soon as it becomes available. **(CLW 5415).**
- **Feb 6 1986 –** Handwritten memo from Elizabeth Betz attached to Mr. Bailey's 06 Feb letter to Mr. Linton. Ms. Betz stated that she has read both the 18 Nov 85 EPA letter and Mr. Bailey's response of 06 Feb 86. She advised that she agreed that MCBCL should not be added to the NPL. She also stated that she does not have the site maps of sample results from round one and can not comment on it. Ms. Betz also noted that Phase one of the NACIP did not find well HP-651, the worst of all the wells, and that she hoped they were headed towards HP-651 because it was not sampled in relation to any NACIP site. **(CLW 5415).**
- **Feb 7 1986 –** Message from Commandant Marine Corps to Commanding General MCBCL. The complete message is missing however, in a letter dated 12 Mar 1986, the message was cited as a reference for the Commandant's approval for the USGS survey of the ground water aboard the base. **(CLW 1445).**
- **Feb 13 1986 –** State report to update status of subsurface investigations at MCBCL. The report indicated that the state was relying on the NACIP study to investigate and provide remedial actions for areas aboard

the base. A notice of violation was served to the owner of ABC One Hour Cleaners but due to his health and problems with the completeness of the notice, an extension was granted. **(CLW 4912).**

- **Feb 18 1986 –** Phone call between Jim Holdaway (EPA), Cherryl Barnett (LantDiv) and Paul Rakowski (NACIP). The conversation was documented in a 25 Apr 1986 letter. The only known result of the conversation was that Mr. Holdaway suggested a review meeting to be held at Camp Lejeune. **(CLW 4929).**
- **Feb 24 1986 –** Phone call between Cheryl Barnett (LantDiv) Robert Alexander (Base Environmental Engineer) concerning records retention. It is agreed that all available data on drinking water for the NACIP program will be centrally stored at the LantDiv Environmental Quality Branch. **(CLW 1426).**

March 6 1986 – Letter from AC/S Facilities, Col. Tiebout to Mr. Arthur Linton of the EPA concerning 1986 Environmental compliance. Col. Tiebout advised notification in accordance with CERCLA has been filed. The NACIP phase two will set 1986 milestones once contract negotiations were completed. The Colonel stated that no detectable levels of TCE or DCE in water since April 1985 (note Benzene and PCE were not included). Once again there was no discussion of past finished water contamination aboard the base. **(Cercla 1999).**

- **Mar 11 1985 –** Letter from Commanding General MCBCL to Commander NavFacEngCom regarding ground water quality data. Col. Tiebout advises NavFacEngCom that his letter contains data provided by the State of N.C. concerning the ground water contamination and data obtained by the Navy contract laboratories should be combined and forwarded to the EPA in response to the EPA letter of 03 Feb 1986. **(Cercla 297).**
- **Mar 12 1986** – Memo from AC/S Facilities, Col. Tiebout to Comptroller authorizing the transfer of $80,000 to fund the USGS ground water study for MCBCL. **(CLW 1445).**

April 8 1986 – memorandum for the file concerning dates raw water wells secured due to VOC contamination. The memo lists all the previously closed well and the dates of closure. There was a handwritten note added after the memo was written indication well TT-25 was closed 14 Jan 87 and well 645 was closed 13 Jan 87. **(CLW 1455).**

- **Apr 16 1986** – Letter from Fred Hill to Utilities director G.S. Johnson Jr. regarding base visit 10-11 April 1986. Mr. Hill documents that work was progressing with expansion work. Several "situations" were discussed with Mack Frazelle, Water Treatment Operator Foreman, including a light oil film on the water surface at Holcomb Blvd and an apparent lack of maintenance at the soon to be abandoned Tarawa Terrace and Camp Johnson facilities. Mr. Hill also advised that if the base proceeds with plans for a private contract to operate water treatment facilities, the state would like to review the final contract. **(CLW 1456).**
- **Apr 25 1986 –** Letter from J.R. Bailey to Arthur Linton, EPA regarding EPA letter 03 Feb 1986 concerning the groundwater contamination aboard MCBCL and the NPL. **(CLW 4927).**
    1. Mr. Bailey agrees to provide the EPA with the analytical data from testing and monitoring of ground water and potable wells aboard MCBCL. The NACIP Evaluation of Data report **(Cercla 388)** was listed in the enclosures and was discussed in the letter as preliminary report prepared by ESE.
    2. The Grainger, Jennings and Army Lab results dating back to October 1980 were not included in the documents provided to the EPA.
    3. Mr. Bailey advises it was the receipt of ESE's raw analytical data which prompted the testing of the base well system in beginning in December of 1984 for VOCs.

June 5 1986 – Letter from Douglas Dixon of N.C. Groundwater section to Dr. Ted Taylor, Toxicologist Environmental Epidemiology Branch. Mr. advises that the Wilmington Regional Office has filed a request for a risk assessment concerning the chemicals found in the ground water at Tarawa Terrace and ABC One Hour Cleaner. **(CLW 4947).**

1. **Jun 12 1986 –** Letter from Dr. Taylor to Douglas Nixon regarding risk assessment request dated 05 Jun 1986. **(CLW 4952).**
    1. recent studies by the National Toxicology Program indicate that Perc (PCE) showed clear evidence of carcinogenicity in both rats and mice.

2. According to the EPA Carcinogen Assessment Group, Perc (PCE) would be listed as a probable human carcinogen.
3. 0.7 ppb of Perc would be the equivalent to a 1 x10 to the (-6) incremental cancer risk.
4. Toluene and benzene were detected in the monitoring wells and were not chemicals used in dry cleaning.
5. TCE, DCE and Vinyl Chloride have been shown to be biodegradation products of Perc (PCE).
6. Vinyl chloride was a known human carcinogen and the removal of Perc (PCE) to prevent the formation of vinyl chloride should serve as a further incentive for clean up.

July 1 1986 – Memorandum for Area Coordinators for public affairs guidance on Hazardous waste site clean-up. **(CLW 6551).**

1. The purpose of the memo was to address recently published EPA regulations regarding public awareness of NACIP activities and clean up.
2. The National Priority List was an EPA listing of the Nation's worst hazardous sites and was required by CERCLA (Comprehensive Environmental Restoration Compensation and Liabilities Act).
3. NPL sites were required to follow written Community Relations Plan which must include the following: Site Specific NACIP objectives, Community Relations plan, a schedule for the completion of NACIP activity and a mailing list of affected and interested groups and individuals. **Note, at this time MCBCL was not a NPL site.**
4. The Public affairs activity must be proactive to assure the public that the Navy was not hiding information concerning former hazardous waste sites on Navy property.

- **July 7 1986 --** Phone conversation between Jerry Perkins (Acting Director N.C. Water Supply Branch) and Robert Alexander (Base Environmental Engineer). Mr. Alexander makes the verbal request to reduce VOC sampling of finished water for Hadnot Point and Tarawa Terrace from weekly to quarterly. The same request was made for well TT-25. The request was granted. **(CLW 1521).**

- **Jul 31 1986 –** Meeting aboard MCBCL concerning NACIP study. Details of this meeting were preserved in the handwritten notes of Rick Shiver. **(CLW 4955).**

1. Mr. Linton of the EPA advises that changes in the regulations over the next 18 months will impact MCBCL and the NACIP study. The EPA contends that MCBCL will rank high on the hazards ranking system for the National Priority list.
2. The EPA feels that the NACIP program and study was not consistent with the National Contingency Plan and wants the NACIP study aligned with RIFS (Remedial Investigation Feasibility Study).
3. The EPA will now require facilities to assess active sources (I.E. Tank Farms & land fills) in addition to inactive sources as previously required.
4. The EPA agrees that the Hadnot Point area was the primary area of concern. **Note the source of contamination for well HP-651 was not determined at the time of this meeting. Well HP-651 is outside the Hadnot Point area referenced in this meeting.**

August 7 1986 – Letter from Chief of Naval Operations concerning Hazardous Waste Site Cleanup-Public Affairs Guidance. The letter was a follow up to the 1 July 1986 guidance memorandum. The previous letter did not necessarily apply to MCBCL as it was not on the NPL. However, the August letter clearly states that Navy policy to be implemented at all installations with hazardous waste sites under study by NACIP was to be proactive in order to assure the public the Navy was not hiding information concerning former hazardous waste sites on Navy property. **(CLW 6553).**

- **Aug 7 1986 –** Phone call from Dr. Miller at the University of North Carolina to Robert Alexander concerning groundwater research. Dr. Miller advises that the University has funds available to install monitoring

wells and sample groundwater as part of the School of Engineering's curriculum and research. Dr. Miller was invited to meet Mr. Alexander at the base 12 Aug 1986. Nor records exist from that meeting.

- **Aug 14 1986** – Letter from Geologist review team to Arthur Linton (EPA) concerning NACIP scope of work. **(Cercla 210).**

  1. The geologist recommended that the report address why PVC was being used to construct monitoring wells. (PVC may affect VOC testing).
  2. Composite sampling of Hadnot Point to reduce cost will do little to pinpoint wells that were contributing contaminants to the water supply system or the movement of contaminants through the shallow aquifer.

September 17 1986 – Letter from Col. Tiebout to Staff Judge Advocate regarding Public Affairs Guidance on the NACIP Program. Col. Tiebout requests JAG to review the 01 Jul and 07 Aug Memos from CNO concerning Navy policy towards hazardous waste sites and CERCLA. He advised that MCBCL was not currently listed on the NPL but that a formal community relations plan should be considered in the future. **(CLW 6551).**

- **Sep 24 1986 --** Base memo from Commanding General concerning additional monitoring by NACIP aboard MCBCL and MCAS New River. The General advised that the Globe will carry an article on the current NACIP activities and local media coverage was expected. He stated that although there were no known human health concerns or dangerous environmental hazards present, a policy of caution and thorough documentation was in effect. **(CLW 1523).**
- **Sep 25 1986 –** Letter from J.R. Bailey to Commanding General MCBCL regarding the USGS proposal to study the water aquifer. Mr. Bailey advised the general that while both the Marine Corps and the USGS wish to study the groundwater the needs of each entity were different. Mr. Bailey then stated "The USGS proposal would have the Marine Corps fund a study suited for the USGS goals but considerably beyond the needs for the Marine Corps." He states that there was a considerable overlap between ESE's work and the USGS proposal including the sampling of contaminated wells to determine the extent of contamination in the groundwater. Mr. Bailey went on to state that the USGS proposal was over priced and that analysis of salt water intrusion can be done with a simple desk top computer. **Note the objection from Mr. Bailey concerning the sampling of contaminated wells is significant. Sampling by an outside agency would mean that control of what was known about the extent of the contamination would be outside the influence of NavFacEngCom and the Marine Corps. (CLW 1527).**

January 21 1987 – Meeting at building 425 aboard MCBCL on review of the NACIP Program. The meeting was documented by the hand written notes of Rick Shiver. **(CLW 4963).**

  1. NACIP confirmation study has verified that 15 sites have contamination, 2 sites show trace levels of DDT, 2 sites have fuel contamination and 3 had no evidence of contamination.
  2. Hadnot Point 602 project. 10 buildings on Hadnot Point identified as places where solvents were being used past and present. Confirmed sources of TCE included base Maintenance (HP1202), graphics shop and Maintenance shop (HP 1601 &1502 areas), motor pool degreasing rack, HP-901, HP 902. Land disposal of waste POL was also verified.
  3. Well HP 645 was shut down on 13 Jan 87 due to benzene contamination. Well AS-106 was shutdown due to DCE contamination on the same day.
  4. EPA will have oversight at NPL sites. Per DOD (Department of Defense)/EPA memorandum of understanding of 1983, the DOD will finance and conduct response while the EPA will provide technical assistance for installations that fall under CERCLA.

February 5 1987 – MCON Project P-853 proposed to relocate Hadnot Point's outdated and leaking fuel farm. **(CLW 1737).** The actual project brief is not available to the public.

March 1 1987 – This was the "official" date given to ATSDR as to when the Holcomb Blvd expansion was completed and the Tarawa Terrace water distribution system was taken off line. However, this is in contradiction to document **CLW 4993.** In this document, Elizabeth Betz advises that Holcomb Blvd Water expansion was completed and the plant began test operating. Tarawa Terrace and Camp Johnson were not utilized during test periods when Holcomb was online. Holcomb Blvd expansion was officially accepted on 01 April1988 and at that point Camp Johnson and Tarawa Terrace WTPs were closed.

It is important to note that in accordance with BUMEDINST 6240.3, Department of the Navy and United States Marine Corps officials were knowingly poisoning their own people during the period of 30 October 1980 - 1 April 1988. Prior to 30 October 1980 this same directive had pre-emptive requirements that if had they been followed, would have eliminated most of the human exposures that occurred after 1963.

- **March 31 1987 –** Phone call between Base Environmental Engineer Robert Alexander and Cheryl Barnett at NavFacEngCom. Ms. Barnett advises Mr. Alexander that the EPA Region IV recommended MCBCL be added to the National Priority List per Surperfund Act. **(Cercla 198).** Mr. Alexander the observes the following:
  1. EPA will increase oversight of NACIP methods, reports and reviews.
  2. The base must prepare a Community Relations Plan.

April 05 1987 – Memorandum for the Commanding General concerning Real Property License Agreement with UNC-Chapel Hill. The purpose of the agreement was to facilitate the University's multi year study of the Tarawa Terrace Exchange Service Station gasoline contamination. The study was funded by the EPA. **(Cercla 196).**

- **April 16 1987 –** Briefing aboard Camp Lejeune concerning USGS Phase one results. Attendees include Robert Alexander, Carl Baker, Al Austin, Mack Frazelle and Lt Col. Kiriacopoulos. There are no known public records detailing the specifics of this meeting. **(CLW 1998).**

May 7 1987 – Letter from USGS to AC/S Facilities, Col. Dalzell regarding results of Phase one of the USGS survey aboard MCBCL. The results of Phase one reveal that the water supply aquifer aboard MCBCL was readily recharged by precipitation and was a very dependable source of water. However, the aquifer was not well protected from potential surface contamination because clay layers above the water supply aquifer that might serve as a barrier are thin and discontinuous. Results suggest that with some relatively inexpensive modifications to future placement of supply wells could significantly improve well yields and reduce overall cost. **(Cercla 1998).**

- **May 27 1987** – Site inspection report for ABC One Hour Cleaners performed by Cheryl A McMorris, Environmental Chemist State of North Carolina Solid and Hazardous Waste Management Branch. The author correctly identifies Tetrachloroethylene (PCE) as the material contaminating the ground water in and around ABC One Hour Dry Cleaner but through out the report she refers to the compound as TCE which is the name given to the sister chemical trichloroethylene. ABC was identified as using PCE in their operations since 1954. PCE was stored on site in a 250 gallon tank located in the rear of the property. Spent PCE captured in a filtration system was disposed on site in pot holes or other areas on the property. ABC was also on a septic tank soil absorption system that drained into the ground thus allowing the PCE to escape into the ground water. The State used the three community water wells (TT-25, 26 and new well) and 3 test wells to determine that ABC was the source of PCE in the water at Tarawa Terrace. An on site well at ABC tested 12,000 ppb PCE. The author of the report was unsure whether the presence of TCE, DEC and Vinyl chloride were related to the PCE. (These products are degradation products of PCE at the time this report was written, this was a known fact). The presence of toluene and benzene are explained as possible by products of PCE or natural background readings. **(CLW 1557).**

June 5 1987 –Letter to North Carolina Division of Environmental Management from J. R. Bailey of LantDiv. The letter advised the state that under CERCLA section 121, that the Navy's remedial action is required to attain legally applicable, relevant and appropriate standards, requirements, criteria or limitations known as ARARs. Mr. Bailey requested the state's input concerning ARARs in order to assist them in obtaining the level of cleanup desire. Mr.

Bailey identified the contaminants of concern as benzene, vinyl chloride, PCE, TCE, 1,2 dichlorethane, 1,1-dichloroethene, and trans 1,2 dichloroethene. **(Cercla 318).**

July 8 1987 – EPA publishes final rule establishing maximum contaminant levels for PCE, TCE and selected other Volatile Organic Compounds. The new monitoring requirements for TCE and PCE become effective on January 1, 1988.

- **July 27 1987 –** Memorandum from Mack Frazelle (Utilities Systems General Foreman) to Director Utilities Branch regarding closed wells aboard MCBCL. Mr. Frazelle raises the question of what were the future plans with the contaminated wells. Mr. Frazelle feels that some of the wells can be possible restarted and others can be cannibalized for their equipment before they seize through lack of use. He requests that the memo be reviewed for consideration. **(CLW 4971).**

August 27 1987-- Letter Dr. Barry Johnson, Associate Administrator ATSDR to LTC. Warren Hull, DOD/EPA Liaison Officer. Dr. Johnson informed LTC. Hull, that in accordance to CERCLA section 104 (i) (6) (a) , the Agency for Toxic Substances and Disease Registry is required to conduct a health assessment for all sites on the National Priorities List including Federal Facilities. **(Cercla 437).**

- **Aug 28 1987 –** Memorandum from Utilities branch to Operations branch regarding TTHM readings. Mr. Baker advises that MCAS is now in compliance but when the MCL is lowered to 5 ppb, then MCAS will be out of compliance. Mr. Baker requests assistance from Operations in meeting this goal. **(CLW 1646).**

September 15 1987 – Letter from N.C. Dept of Human Resources to AC/S Facilities MCBCL. The state advises that the USEPA has changed rules for Safe Drinking Water Act and that 44 synthetic chemicals (including PCE, TCE, DCE and vinyl Chloride) will be monitored on a quarterly basis. **(CLW 5432).**

- **Sept 16 1987** – Meeting with LantDiv and Environmental Science and Engineering inc. regarding Installation Restoration Program (new name for NACIP). Base Engineer Robert Alexander was the attendee from MCBCL. The purpose of the meeting was to review the IR program status, specifically to review the proposed remedial actions for the Hadnot Point groundwater problems and to examine data colleted to date on the remaining 22 IR sites aboard MCBCL. **(Cercla 261).**

1. 15 Volatile Organic Compounds have been identified in the shallow aquifer. Four of the most serious compounds violate recommended state and EPA standards.
2. Two large plumes have been identified in the shallow aquifer. The first includes a portion of the industrial area between building 1700 and Burger King (Holcomb Blvd to Louis Street). The second includes the area from the fuel farm on Ash St NW to Sneads Ferry road and from Holcomb Blvd to Louis Street.
3. Most significant issue to be determined was at what level the MCBCL needs to remediate the groundwater. Mr. Alexander advises that the state is in the process of revising their groundwater standards.
4. Deep well monitoring has identified Methol Ethyl Ketone (MEK a compound used for cleaning and stripping) in the deep aquifer. The presence of this compound in the deep well aquifer will compound the problem as treatment options for VOCs do not work to remediate MEK.
5. ESE described a tentative list of short and long term remedial options. However, these options will cause additional environmental emissions through one of three possible medias 1. Sewage treatment plant. 2. Air emissions **(note this option involves a known viable pathway for exposure.)** 3. Package VOC for hazardous waste disposal off base.
6. Mr. Alexander recommends that the pumps and equipment from the eight contaminated Hadnot Point supply wells be pulled and reused else where.
7. ESE was tasked to provide draft report in the next few months after the meeting. The state and EPA were to be provided a copy for their review. This was to be followed by a briefing. As for the other 22 IPR sites, nine were recommended for closure due to lack of documented evidence of contamination, six needed a risk analysis and seven were to require continued monitoring and development of a cleaning program.
8. Mr. Hubbel of CMC LFL recommends that MCBCL and LantDiv should work to release some of this information to the public in accordance with superfund amendments. Mr. Alexander adds that they will

need to review this will JPAO and develop a cooperative effort in light of these rules and the possibility that Camp Lejeune sites could be named to the EPA NPL.

- **Sept 23 1987 –** Phone call memo for conversation between Cheryl Barnett of LantDiv and Robert Gregory of Environmental Science and Engineering (Confirmation Study Contractor). The conversation is concerning the ARARs proposed by the State of North Carolina. The state was requested to provide their input on June 5th by J.R. Bailey of LantDiv. Mr. Gregory advised that the 10 to the minus 6 levels are only used when exposure is by drinking contaminated water and/or eating contaminated organisms. He feels this is not applicable for Camp Lejeune. ESE feels that accepting ARARs will set a poor precedent for all future North Carolina work and is not in accordance with EPA guidelines. He advocated using MCLs (Maximum containment levels) for the Hadnot Point area. Cheryl Barnett agreed with this recommendation and received guidance that the state should be asked at the beginning for potential ARARs, but the Navy would select the actual ARARs during analysis. **(Cercla 413).**

October 28 1987 – EPA amends SDWA to include notification of consumers when certain violations of the National Primary Drinking Water Regulations or monitoring requirements occur. The use of lead pipe, solder and flux for installation or repair of any public water system is prohibited. The effective date of these changes will be 28 April 1989. **(CLW 1662).**

December 4 1987 – Memorandum from Base Maintenance Officer to Director NREAD concerning reclaiming closed wells. Mr. Baker requests that nine of the fifteen closed wells be re-sampled for VOCs in order to determine if any can be reclaimed. **(CLW 1671).**

January 27 1988 – Letter from the State of North Carolina Division of Human Resources to MCBCL regarding the Holcomb Blvd plant expansion. The state advises that they have reviewed the plans and records and have approved the plant's expansion for operation. **(CLW 1680).**

February 8 1988 – Letter from JAG to State of North Carolina Department of Justice Attorney General. JAG Col. Tokarz writes to inquire into potential actions to be taken by the State against ABC One Hour Cleaners. Col. Tokarz also places the State on notice that the Marine Corps may wish to purse their clean up cost for Tarawa Terrace as well. **(CLW 1716).**

- **Feb 29 1988 –** Letter from North Carolina Division of Health Services to MCBCL regarding lead notification required by amendment to the Safe Water Drinking Act. The letter advises that unless a water system owner can provide documentation that the pipe or pipe fittings of any given system is less than eight percent of the entire system or plumbing in any home connection is less than 0.2% lead, then public notification of lead was to be given to all consumers on the system. **(CLW 1690).**

March 15 1988 – Action brief from Utilities Branch concerning clarification of Environmental responsibility aboard MCBCL. Utilities Branch Director (C. Baker) writes the brief out of concern arising from out of concern over who or what department on base is in charge of environmental affairs, Who represents the base to governmental authorities and conflicting priorities among the various departments on the base itself. This confusion and lack of organization has led to numerous environmental related problems aboard MCBCL. The problems involved permit violations, operation of utilities plants, monitoring of waste treatment plant discharges, maintenance and repair of facilities, and the expansion of utilities. **(CLW 1696).**

- **Mar 18 1988 --** Message from Col Lilley concerning action brief 15 Mar 1988. Col Lilley requests a meeting to discuss Mr. Baker's action brief and agrees there should be a clear division of responsibilities among the area of the base regarding environmental concerns. **(CLW 1699).**
- **Mar 23 1988 –** The Assistant Chief of Staff Facilities notified the Commanding General of the situation concerning the leaking fuel farm. He is advised that a MILCON project is scheduled in the out-years for replacement of the leaking UST's with a possibility that replacement could be moved up to a near year. **(Cercla 96).**

- **Mar 29 1988 –** Letter from Staff Judge Advocate, A. P. Tokarz, MCBCL to Assistant Chief of Staff Facilities MCBCL. The letter is in reference to the leaking underground storage tanks (USTs) at the Hadnot Point fuel farm. **(Cercla 96).** See pp 33-34 of the document.

1. Base Environmental Engineer, Robert Alexander, advised, at a workshop held prior to the letter, the USTs at Hadnot Point were in such a deteriorated stated that they continue to leak at a rate of approximately 1,500 gallons per month.
2. Mr. Alexander advised the Staff lawyer on 25 March that the base planned to address the problem by installing more monitoring wells to identify the plume, design recovery wells, receive bids to construct a recovery system, determine the disposition of the recovered fuel and then award a contract.
3. Mr. Tokarz recommended that pressure be applied to HQMC to move up the replacement of these leaking USTs to the immediate future. He stated that the loss of 1,500 gallons per month will be difficult for taxpayers to understand, and the extremely high cost of recovering that lost fuel exacerbated the problem. He also advised that the value of recovered fuel would be diminished due to the presence of other contaminants in that area.
4. Mr. Tokarz also pointed out that a delay in replacing the tanks will result in an indefensible waste of money, and a continuing potential threat to human health and the environment. He felt that formally applying to HQMC for expedited action would assist in demonstrating to the public and the residents of Camp Lejeune that the Command took swift, reasonable action.
5. A recommendation was made to notify the state of North Carolina Department of Environmental Management. Mr. Tokarz advised that a crucial objective in the NPL process was for the base to establish credibility with the state and the public.

April 1 1988 -- Elizabeth Betz advises that Holcomb Blvd Water expansion was completed in 1987 and the plant began test operating. Tarawa Terrace and Camp Johnson were not utilized during test periods. Holcomb Blvd expansion was officially accepted on 01 April1988 and at that point Camp Johnson and Tarawa Terrace WTPs were closed. **(CLW 4993).**

- **April 4 1988** – Action Brief concerning Lead notification. AC/S Facilities, Col. Dalzell recommends that Lead notification be published in the Globe magazine once a month for three consecutive months to fulfill requirements of public law. **(CLW 1700).** The notification proposal was approved for publication by Col Dalzell. **(CLW 1711).**
- **April 14 1988** – Letter from J.R. Bailey to Nancy Redgate (EPA SF Program) concerning Preliminary Assessments for facilities listed on the Hazardous Waste Compliance Docket. MCAS New River is one of these facilities. Mr. Bailey advises that MCBCL is not on the docket but that the facility has already been scored and will be proposed for the NPL shortly. **(Cercla 284).**
- **April 21 1988** – Memorandum from Col. Dalzell to Director NREAD. Col Dalzell requests that testing contract for water be modified to include lead and other heavy metals. **(CLW 1707).**
- **April 22 1988** – Letter from AC/S Facilities, Col. Dalzell to Ms. Perez (Techlaw Inc) concerning follow up on a phone conversation on ABC One Hour Cleaners. Col. Dalzell writes to inquire on what actions are being taken against ABC for the Tarawa Terrace contamination. **(CLW 1712).**

May 11 1988 – ESE Confirmation Study Characterization Step Report for Hadnot Point Industrial Area. **(Cercla 258 & Cercla 48)** Summary of findings:

1. Buildings 901,902,903,1202,1502, and 1601 appear to be the sources for the three contaminated areas at the Hadnot Point Industrial Area.
2. Soil and Gas investigation confirmed the presence of TCE at these three sites and in limited quantities at several other sites.
3. The potable water obtained for MCBCL is derived from a sand/limestone interval which is highly permeable. Groundwater flow was generally towards the New River. The flow into the deep aquifer zone could not be definitively established by the current data due to a scarcity of sampling points.
4. Two contaminated plumes of VOCs and petroleum hydrocarbons were found to exist. The northern plume consists of 2 sources of contamination centered around building 901 (maintenance shop) and the Hadnot

Point Fuel Tank Farm. The data suggests that these two plumes have coalesced into one large plume of contamination. The southern plume was centered around the maintenance facility associated with buildings 1601 and 1709. Voc contamination of the deep aquifer has not been established but is assumed to have occurred due to the presence of contaminated supply wells adjacent to the Hadnot Point Industrial Area.

- **May 13 1988 –** Letter from Commanding General MCBCL to Commandant Marine Corps regarding groundwater contamination at Tarawa Terrace. Information concerning details of the contamination forwarded to HQMC. **(CLW 1716).**
- **May 18 1988 –** Letter from AC/S Facilities, Col. Dalzell to Preston Howard (North Carolina Division of Environmental Management) regarding notice of release from underground fuel storage facilities at Hadnot Point fuel farm. Col. Dalzell informs the State that engineers have located and defined a plume emanating from MCBCL's fuel farm at Hadnot Point. He further advises that the Commanding General has order the farm closed and an interim fuel farm be established with all environmental precautions to prevent further contamination. **(CLW 1734).**
- **May 18 1988** – Letter from Commanding General MCBCL to Commandant Marine Corps concerning documented groundwater contamination at Hadnot Point fuel farm. The General makes the request to expedite funding for the 05 Feb 87 MCON proposal to relocate the aging and leaking Hadnot Point fuel farm. The General confirms that gasoline derivatives and other volatile organic compounds have been found in the water supply aquifer and the deep water aquifer underneath the fuel farm. The General also advises that inventory records indicate a continued loss of fuel into the ground and that a "positive and swift action" will demonstrate their commitment to the environment to the various regulatory agencies overseeing MCBCL. **(CLW 1737).**
- **May 24 1988** – Message from Commandant Marine Corps. HQMC advises all stations that they shall give notice in accordance with SDWA concerning lead in the drinking water systems. Notice shall be given in the form of newspaper articles and mailers in bills. **(CLW 1714).**

June 1988 – Camp Lejeune Military Reservation (Including MCAS New River) and ABC One Hour Cleaners are both proposed for listing on the EPA's National Priority List as a Superfund hazardous waste site under CERCLA. **(CLW 4976).**

1. Ground water at the base is shallow (10ft) and subsurface formations are permeable (conditions that facilitate movement of contaminants into ground water). An estimated 13,800 people obtain drinking water from wells within 3 miles from site # 21. The nearest well was 1,400 feet away.
2. VOC contamination in the shallow and deep water aquifer.

- **June 1988** – MCAS New River Water Treatment study prepared by Hobbs, Upchurch and Associates. P.A. The study recommends the installation of an ammonia feed system to treat the water used for MCAS. The system will prevent the formation of TTHM and bring the air station within compliance of the proposed 0.05 ppb standard. **(CLW 6036).**

July 14 1988 – Letter from Commanding Officer MCBCL to Commanding Officer MCAS New River regarding water samples from Officer's club. Analysis indicated that bacteriological contamination existed in the club's drinking water. **(CLW 1784).**

- **July 15 1988** – Letter from Commandant of the Marine Corps to all commands including Camp Lejeune regarding Installation Restoration requirements and procedures. The letter encourages full and open cooperation with regulatory agencies and the public in regards to clean up at past disposal sites. The Commandant also advised that as amended by the Superfund Amendments and Reauthorization Act, the USMC was required to comply with CERCLA just as any non-governmental entity. Contained within the enclosure is an excerpt from CERCLA discussing document retention under CERCLA for 50 years. **(Cercla 577).**

- **July 18 1988** – The state advises that measures to be taken to disinfect the officer's club and that bottle water must be provided until the entire potable water system (MCAS) was completed. **(CLW 1787).**
- **July 29 1988** –MCAS officer's club was declared free of coli form bacteria. **(CLW 1791).**

August 3 1988 – Letter to commanding General MCBCL concerning Installation Restoration Contract Report. The enclosed report indicates in section 3.5 **(CLW 6298).** ESE recommends the evaluation and discontinuation of practices at Hadnot Point Industrial Area (HPIA) which may result in contamination of the soil and groundwater. All current disposal practices should be evaluated for environmental contamination potential. Fuel tanks and underground tanks should be tested for leaks. **(CLW 6298 + CLW 6300).**

- **Aug 5 1988** – Memo to Utilities director Mr. Baker from Mr. Elston. Mr. Baker is advised that the supply wells will be tested for VOCs over the next three or four months and to hold off on and further action until that time. **(CLW 1793).**

- **Aug 9 1988** – Technical Review Committee held aboard Camp Lejeune. The committee is sanctioned by the 1986 Superfund Amendment Reauthorization Act from Congress. The purpose of the committee it to keep the community informed of actions occurring on a superfund site such as Camp Lejeune. **(Cercla 47).** The meetings were intended to encourage fluid discussion and to provide the Chairman with comments on studies and remedial action. EPA and state agency members were expected to serve as their agency's spokesperson and positions advanced by these members during the meetings are considered the agency position. **(Cercla 489).**

1. The Hadnot Point Industrial Area site was created as a mechanism to attempt to explain and locate the TCE contamination of well HP-651. The initial three Hadnot Point sites were located well away from the well and thus could not be a source of contamination for that well. The source was discovered in 1992 and became known as site 82, VOC disposal area).
2. Cheryl Barnett from LantDiv states "As part of that effort (Confirmation Study 1984), we sampled a lot of potable water wells here on Camp Lejeune, and we discovered some contamination in basically eight wells that were immediately closed by the base." Ms. Barnnett's statement fails to account to the Jenning, USAEHA and Grainger lab reports dating back to October 1980 which indicated that these chemicals were in the water 4 years before the base "immediately" closed the wells.
3. The current NACIP study only has three 75-150 foot monitoring wells and thus according to Mr. Alexander, "we don't have the data" to tell where the deep water is going or the extent of the contamination in the deep water aquifer.
4. An information repository was established at the Onslow County Library.
5. Possibilities for remediation were reviewed including air stripping and filtration of the VOCs.

- **Aug 25 1988 –** Letter from the State of North Carolina Department of Human Resources advises the Commanding General of MCBCL the base has been selected for the EPA's National Pesticide Survey of public drinking water wells. This means that the base's water systems will be tested for pesticides. The base was to be notified of the results before they were released to the public. **(CLW 1801).**

September 14 1988 – Letter from Director NREAD to AC/S Facilities, MCBCL regarding testing supply wells for VOCs. Samples were taken from HP 642, HP 603 and the Hadnot Point WTP. Detection limits were set at 10 ppb for the test. The samples were taken 11 Aug and sent to JTC labs for testing. **(CLW 1807).**

- **Sept 22 1988 –** Letter from North Carolina Department of Natural Resources and Community Development to AC/S Facilities, MCBCL. The letter was written to advise MCBCL that North Carolina's Groundwater classifications and Standards (15 NCAC 2L) were being revised. The major revisions include the establishment of numerical standards for VOCs. **(CLW 1808).**
- **Sept 29 1988 –** Letter from EPA Chief Lucius (Site Investigation and Support Branch) to AC/S Facilities, Col. Dalzell concerning comments for Characterization Step Report from ESE. The EPA recognized MCBCL for their attempts to comply with CERCLA requirements before MCBCL was listed on the NPL (Formation of the TRC and development of a Community relations plan). The EPA provided comments concerning the upcoming remedial work at MCBCL. **(Cercla 262).**
    1. Air testing around the sewage plant to monitor for possible toxic air emissions.

2. Air stripping was a proven technology and was highly effective at removing VOCs. A vapor recovery system should be installed to insure acceptable air emissions.
3. Efforts to determine the extent, concentration, rate and direction of migration of contamination need to be expanded to include all 40 CFR Section 261 requirements.
4. All solid waste management units needed to be investigated for releases.
5. Contaminants with no current health effects criteria should be remediated using the Hazard Index for systemic toxicants.
6. Generated sludge should be treated as hazardous and treated in accordance with RCRA.
7. Lead removal in ground water needed to be addressed before discharges into streams and waterways.
8. Biological treatment of benzene, methylene chloride, toluene and TCE were not recommended because of extremely slow rates of biodegradation.
9. If biological treatments are used, then MCBCL will need to address vapor recovery in order to protect air quality.
10. Any sewage discharge will need to be permitted in order to monitor for VOCs.
11. Characterization of the Deep water has not been completed and will need to be addressed in order to comply with CERCLA.
12. The Feasibility Study (ESE) read that the clean up for contaminated water in the deep aquifer will be developed separately after collecting additional data. However, the EPA notes no plan for collecting this data was presented.
13. No information concerning the hydraulic functioning of the shallow aquifer was submitted to justify the use of 32 recovery wells slated for use to recover the shallow aquifer. This data was needed by the EPA to check the adequacy of the recovery work with their computer models.
14. Five years was considered an unreasonably short time for clean up of the groundwater system contaminated with an large plume as existed at MCBCL. Thirty years was recommended as a more realistic time frame.
15. The EPA requested a written response before the next TRC meeting scheduled for Jan/Feb 1989.
16. The EPA recommended early negotiations with the Marine Corps to enter into an Interagency Agreement (IAG) to facilitate the clean up of Camp Lejeune.
17. Camp must develop and submit a Health Risk Assessment to the EPA.

October 5 1988 – Letter from Commanding General MCBCL to NavFacEngCom regarding IR program Hadnot Point Industrial Area. The General requests NavFacEngCom to evaluate ESE's Feasibility Study for Hadnot Point and provide any recommended revisions. **(Cercla 260).**

December 5 1988 – NAVMEDCOM Instruction 6240.1 Standards for Potable Water. This order **cancelled BUMED instruction 6240.3C**. The purpose of the new instruction remains the same, (to establish potable water standards for the Navy and the Marine Corps). However, the language of the new instruction is significantly revised. **(NAVMEDCOMIST 6240.1)**

1. The definitions describing **Health Hazards** and **Pollution** are **removed.**
2. The language contained in the prior BUMED, "substances which may have a deleterious (harmful) physiological effect or for which the physiological effects are not known, shall not be introduced into the water system in a manner which would permit them to reach the consumer", was **removed**.
3. This revision replaces what was then a more advance and comprehensive potable water standard with a new standard which was in agreement with the current SDWA requirements in force at that time.

- **Dec 7 1988** – Contaminated Ground Water Study Report for the Hadnot Point Fuel Farm. The report was prepared by O'Brien & Gere engineering for NavFacEngCom. **(Cercla 417).**
  1. Fuel losses of gasoline occurred predominantly through leaks in the transfer lines or valves resulting in the formation of 2 plumes.
  2. The geology of the area consists of primarily silty sand with occaisional discontinous clay layers. Note this means contaminants were not confined to the areas where there were originally spilled.

3. Their studies indicated the presence of a **free phasing product** in the groundwater that ranged from **.24 feet to 15.34 feet in thickness**. Analysis of the ground water identified significant levels of dissolved petroleum compounds including **benzene, toluene, xylene and ethylbenzene.**
4. The extent of the benzene plume was not fully defined and exceeded the EPA's maximum containment level of 5 parts per billion.
5. Traces of other VOCs including tetrachloroethylene and trichloroethylene were detected at the Hadnot Point Fuel Farm.
6. The engineers recommended review of past inventories to help identify which tanks were leaking, initiate a storage tank management program or systematic removal and replacement of all the underground tanks, remediation of soil and ground water underneath the tanks.

- **Dec 12 1988** – Letter from Paul Rakowski Head, Environmental Programs Branch Utilities, Energy and Environmental Division (Navy) to Dr. Barry Johnson Agency for Toxic Disease Registry (ATSDR) regarding Health Assessment MCBCL. Mr. Rakowski makes the formal request per CERCLA law for ATSDR to perform a Public Health Assessment for MCBCL. He also requests a review and comment on the draft before it's release to the public. **(CLW 4989).**

- **Dec 28 1988** – EPA letter from Site Investigation and Support Branch to AC/S Dalzell MCBCL. The letter advises the base that the EPA and The North Carolina Hazardous Waste Branch will conduct a RCRA Facility Assessment (RFA) at MCBCL in January of 1989. **(Cercla 265).** The purpose of this assessment is:
    1. Identify and gather information on Solid Waste Management Units.
    2. Make preliminary determinations regarding known or suspected releases of hazardous wastes or constituents from SWMUs.
    3. Make determinations of the need for further actions.
    4. co-ordinate RCRA and CERCLA activities and responsibilities.

January 09-23 1989 – Letters between Director NREAD to base AC/S Facilities, concerning drums of DDT discovered at lot 203. During an inspection with the EPA, 5 barrels of DDT were discovered buried at lot 203. **(Cercla 276, Cercla 277, Cercla 279, and Cercla 289).**

1. A former DRMO employee (Mr. Pallotti) was contacted and interviewed concerning the DDT disposed at Lot 203. Mr. Pallotti revealed that between 1963 and 1980 various wastes were disposed of at Lot 203. The wastes included solvents, PCB, used battery acid and waste oil. Mr. Pallotti also advised DDT was stored in a trailer at lot 203 (please see 20 Nov 79 item # 11 entry for **CLW 263**) but he was not aware that DDT was buried at lot 203.
2. Mr. Pallotti stated 4 former DRMO lot employees had died, at least one died of cancer. Mr. Pallotti himself would later die of cancer.
3. The decision was made to remediate the exposed 5 barrels and leave the rest undisturbed until the Installation Restoration Program completes their inspection and assessment of Lot 203 (I.R. site 6).
4. Julian Wooten recommends that Base Safety and PMU investigate BRMO lot 203 and provide recommendations relative to any immediate threat to human health.

February 07 1989 – Letter to Commanding General MCBCL from AC/S Facilities, Col. Dalzell concerning Site Survey Report on Lot 203 by Base Environmental Engineer Robert Alexander. Col. Dalzell reports to the Commanding General that there is a presence of organic vapors at lot 203 and potentially affecting personnel at the site. A hand written note at the bottom of the page that personnel working at the lot have been removed. Mr. Alexander's attached report indicated that there was no imminent hazard and that normal operations of lot 203 should continue pending additional monitoring under the Installation Restoration Program. Mr. Alexander also recommended that activities should be conducted to minimize subsurface excavations around lot 203 and a 30 foot section of test area 4 be fenced pending further investigation. **(Cercla 306).**

March 20 1989 – Response to letter from NREAD to AC/S Facilities, Col. Dalzell concerning Cleanup of Lot 203. Col. Dalzell advises Julian Wooten to proceed with emergency contract to locate and hire firm capable of cleaning up the barrels at Lot 203. **(Cercla 303).**

- **March 21 1989** – Letter to AC/S Facilities, Col. Dalzell concerning lot 203 soil samples. Per direction of the EPA, the soil samples from lot 203 were sent to the OSHA lab in Utah. Upon receipt of the samples, The OSHA lab advised that they would not be able to perform the analysis. The samples were then sent to an environmental lab for testing. **(Cercla 287).**

April 11 1989 – Letter from Supervisory Chemist Elizabeth Betz to Director NREAD concerning water monitoring as related to the Installation Restoration Program. Ms. Betz advises that she feels monitoring of all wells on base was very important and resists the idea of only sampling the wells nearest IR sites. Ms. Betz recalls how well HP-651 was well outside known contamination sites and that it would not have been discovered if they had not sampled all of the best wells in 1985. She also advises that well HP-651 was the worst of the contaminated wells on the base. She also recommends that wells 603 and 642 be sampled quarterly as they are near possible contamination. Finally Ms. Betz states that monitoring for Synthetic Organic Chemicals be completed quarterly until approved by the state. **(CLW 1818).**

May 10 1989 -- Letter from N.C. Department of Human Resources Division of Health Services to AC/S Facilities, MCBCL regarding SOC monitoring for Courthouse Bay WTP. The State advises MCBCL that the required SOC reports have not been filed and that per state regulation a notification must go out to users of the system advising them that MCBCL has not performed the required test. The State also reminds MCBCL that it was their (the base) own responsibility to provide test results within the required time frame. **(CLW 1824).**

- May 17 1989 – Letter from Commanding Officer to Commanding General MCBCL concerning Lot 203 test results. Mr. Wood advises MCBCL that preliminary soil test performed on the February samples indicates the presence of Lead, Chromium and Mercury. The organic analysis was not performed. A review of current lot 203 employee medical records revealed no abnormalities to date. Mr. Wood also recommends another round of testing be completed and that the base review safety procedures for employees of the lot. **(Cercla 288).**

June 20 1989 –Health Advisory Trichloroethylene (TCE) from EPA. TCE is now cited as a probable human carcinogen. **(CLW 1830).**

July 28 1989 – USEPA sends letter to MCBCL concerning recent inspection of the base and notification of violation of North Carolina's Hazardous Waste Management Rules. The base was found to be in violation of the following rules **(Cercla 246)**.

1. A generator of hazardous waste shall not accumulate hazardous waste on site for more than 90 days in an area that is not permitted or have interim status for storage.
2. A generator of hazardous waste shall not accumulate hazardous waste on site for more than 90 days must inspect areas where containers are stored at least weekly. The inspection log will kept for 3 years. Upon inspection, there were missing weekly logs at building 1775.
3. Hazardous wastes were found to be stored in areas not permitted.
4. Lack of training materials for personnel handling wastes.
5. Various incidents of improper labeling, mixing of types of waste and failure to secure lids.

- **July 20 1989** – Newspaper article advising the SOC analysis run for Courthouse Bay, Rifle Range and Onslow Beach were run in March 1989. **(CLW 1853).**

August 9 1989 – Letter from the Commanding General MCBCL to Commandant of the Marine Corps. Concerning Construction Contract 89-B-2611 Temporary Fuel Farm (Hadnot Point). The purpose of the letter was to provide HQMC with the background data used to justify the funding of the temporary fuel farm with M2 funds. **(Cercla 96).** See page 1.

1. The fuel farm was originally constructed in 1943 and consisted of 17 tanks ranging from 3,000 to 600,000 gallons.
2. Study (O'Brien & Gere) indicate that significant amounts of free fuel are located under the fuel farm.
3. Several potable water wells in the fuel farm area were shut down due to the detection of benzene and other chemicals in the water.
4. HQMC project LE201M and LE433R were undertaken in the early 1980's but during the design of the project, it was discovered that the cost to replace valves necessary to isolate tanks and allow leakage testing was not economically feasible due to the age of the tanks (40 years) and a decision was made that the fuel farm was beyond its expected life. A MILCON project was submitted to replace the fuel farm.
5. Upon the receipt of the O'Brien & Gere study, the State of North Carolina was notified of the leaks and the fuel farm would be immediately shut down. Notification of the release of fuel products was sent to the State of North Carolina May 18, 1988. The fuel farm remained in operation as noted in the next entry.
6. Despite the May 1988 notification the fuel farm remained in operation.

Aug 31 1989 – *Globe* news Article "Base Taps into Drinking Water Concerns" the article provides the Marine Corps viewpoint on the events leading up to and just after the contamination aboard MCBCL was "officially" discovered. **(CLW 1854).**

1. Contamination was found and verified at 15 cites. B.W Elston (Dep. Asst. C/S Facilities) stated, "Even then, none of the contamination found was above the limit described as acceptable by the EPA."
2. Mr. Elston also stated, "We closed eight wells in the Hadnot Point Industrial Area and two in Tarawa Terrace area as a precautionary measure and still had adequate water supply."
3. Supervisory Chemist Elizabeth Betz stated, "We shut down some wells that were not near the EPA limit."
4. Betz was also quoted, "You'd have to look at each VOC individually, but many of them are carcinogens. That's the main reason we immediately shut the wells down, although the levels we found in the tests were not near the EPA limit."
5. The contamination was caused by long-term spillage and dumping in the Hadnot Point Industrial Area. Most of the chemicals found were solvents used to clean vehicles.
6. Betz commented in Tarawa Terrace "We were puzzled when that chemical showed up. At first we couldn't figure out how it had gotten into Tarawa Terrace's system. Then we looked across Highway 24. There was dry cleaning business right across the road from the housing area." **(Note, please see BUMED 6240.3B and BUMED 6240.3C).**
7. The article states that base officials took immediate action to pump safe drinking water into Tarawa Terrace. No mention is made of the March 1985 action brief and the use of contaminated TT-New well during the 5 month interim to install the auxiliary pipe line to Tarawa Terrace.
8. Betz also stated, "Once you have identified where the potential for a threat is, you start taking action to correct it. You can't leave a contaminant in the ground water."

September 7 1989 – *Globe* follow up article. "Efforts Underway to ensure safe drinking water." The article is the second part of a three part series written by the Marine Corps to explain the contamination and clean up of MCBCL. **(CLW 1856).**

1. The Marine Corps, Department of the Navy and the EPA will work to coordinate how all parties will approach the clean up aboard MCBCL.
2. Closing of the Hadnot Point fuel farm was pending funding. According to Elston, "We are awaiting urgent construction funds from HQMC to build a new facility."
3. Betz advises that the base water supply systems currently meets all Federal standards and recent tests have shown no contaminants in the water system.

- **Sep 14 1989 –** Marine Corps *Globe* article: "Measures taken to prevent future water contamination. This is the last in a three part article explaining the contamination and clean up at Camp Lejeune. **(CLW 1859).**

    1. Mr. Elston, "Most of the problems we are dealing with stem from years ago, when solvents and fuels were used all over the place and routinely dumped. Over the years, it built up."

2. Mr. Elston states, "Violations are reported promptly and corrected immediately."
3. According to the article, the base's dedication goes beyond mere inspections. 'The base recently sponsored a week-long training program for Marines involved with the handling, storage of hazardous materials and wastes and included briefings about state and federal regulations and procedures."
4. The base is awaiting listing on the NPL for additional funding for clean up.
5. Betz states, "The best way to avoid future contamination is to have good housekeeping in maintenance areas. If someone is sloppy, it will get into the system."
6. Finally, Mr. Elston ends the article with the following quote, "We always take measures to go at least a step beyond what is required by law and to ensure we don't provide water that is unsafe for those using it. The Commanding General will accept nothing less."

October 1 1989 – Work Plan for Product Recovery System Design Hadnot Point Fuel Farm at Camp Lejeune, Contract No. N62470-88-R-5255, prepared by O'Brien & Gere for NavFacEngCom. The purpose of the report was to provide a basis for the recovery system for the fuel farm at Hadnot Point. **(Cercla 381).**

1. The fuel farm was constructed in 1941 and was comprised of 15 fuel storage tanks (795,000 gallons of fuel capacity).
2. The natural drainage area is towards Wallace Creek (note, this is in the direction of well HP-602 but not cited in the report).
3. Their studies indicated the presence of free phasing product in the groundwater that ranged from .24 feet to 15.34 feet in thickness. (see page 10 of the report).
4. Two large plumes (pools) of product were identified.

October 4 1989 – Marine Corps Base Camp Lejeune and Marine Corps Airs Station New River are place on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priority List as Camp Lejeune Military Reservation. **(CLW 4976).**

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RESPONSE TO POST-HEARING QUESTION SUBMITTED BY HON. DANIEL K. AKAKA TO MICHAEL SEAN PARTAIN

Question 1. You stated during the hearing that you have found approximately 40 men who were stationed or lived at Camp Lejeune who have breast cancer. Have you shared this information with the Marine Corps and the National Research Council, and if so, when?

Response. As of November 2009, we have identified a total of 53 men with male breast cancer who either served aboard Camp Lejeune or were a dependent living on the base during the time of the drinking water contamination. The existence of this cluster was first revealed to the National Research Council (NRC) in November 2007 when Mr. Kris Thomas, a dependent exposed while living at Tarawa Terrace in the 1960's and 1970's, addressed the NRC's Camp Lejeune committee in Jacksonville North Carolina. Mr. Thomas informed committee members that there were at least two cases of male breast cancer in children from the base. The next day, the Jacksonville Daily News printed a story with this information, including the names of former residents with male breast cancer.

In January 2009, I traveled to Washington, D.C., to speak before another NRC committee reviewing the EPA's Draft Risk assessment for tetrachloroethylene (PCE), one of the chemicals found in our water at Camp Lejeune. My presentation included the revelation that our number had increased from two to nine men with breast cancer from Camp Lejeune. The project director for this Committee was Susan Martel. Ms. Martel also concurrently served as the project director for the NRC's Camp Lejeune committee during the time period when both committees were empanelled. The Camp Lejeune male breast cancer issue then received increased media attention following the retraction of the ATSDR's 1997 Public Health Assessment for Camp Lejeune. We identified a total of 20 cases of male breast cancer originating from the base during the time between November 2007, the first announcement of the existence of the male breast cancer cases, up until the end of June 2009.

Since the release of the NRC's Camp Lejeune report, we have identified 33 additional cases for the total of 53 men. The NRC's final report mentions male breast cancer at Camp Lejeune only in passing (See Enclosure A, Public Summary and Context section, page 7, of the NRC Report on Camp Lejeune) and the disease was summarily dismissed from their conclusions and recommendations. The NRC report also failed to recommend any future studies into this unusual and emerging cancer cluster. On July 23, 2009, the National Resources Defense Council urged ATSDR to disregard the NRC's inattention toward the male breast cancer cases at Camp Lejeune and stated "the prevalence of male breast cancer among former and current

Lejeune residents should be given particular attention because of its rarity in the general population." (Enclosure B)

The Agency for Toxic Substances and Disease Registry (ATSDR) was also notified about the existence of male breast cancer at Camp Lejeune. ATSDR is the government agency mandated by Congress under Title 42 of the U.S. Code to conduct research into health effects due to environmental exposures at National Priority List sites such as Camp Lejeune. On October 14, 2009, the ATSDR Community Assistance Panel (CAP) discussed the existence of the male breast cancer cluster aboard the base. Unfortunately, the Marine Corps is unable or unwilling to provide this agency with an accurate number of men stationed aboard the base during the contamination period so that epidemiologists such as Dr. Frank Bove (ATSDR), Dr. Richard Clapp (CAP Member) or Dr. Devra Davis (CAP Member) can estimate the number of cases of male breast cancer expected to occur in the population. Without these critical data, it is difficult to precisely evaluate the significance of the number of cases we have discovered over the past two years. According to the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program, the occurrence rate of male breast cancer in the U.S. general population is about 1 in 100,000. Most of the cases are diagnosed occur in men over 70 years in age. The median age of diagnosis for breast cancer in men is about age 67. More than half of the men identified from Camp Lejeune were diagnosed under the age 56, and several cases were in men in their twenties and thirties.

The Marine Corps was first made aware of the existence of male breast cancer at Camp Lejeune when I was nominated as a member to the ATSDR CAP in December 2007. I am not aware of any action taken by the Marine Corps concerning the existence or significance of the cluster other than a series of communications from Headquarters Marine Corps Public Affairs the day I testified before this Committee in October 2009.

It is my understanding that on this date, Major Dent from the Public Affairs Office contacted news agencies to inform them that the expected occurrence rate for male breast cancer was 1 in 1,000 and that based on a population of 400,000 men from Camp Lejeune, there should be approximately 400 cases of male breast cancer from the Camp Lejeune population. The email went on to suggest that the media outlet was not accurately reporting the story and that there was no significant male breast cancer cluster at Camp Lejeune. I have attached a copy of this email from Major Dent, with the recipient's name redacted for the Committee as Enclosure B. Neither I nor the Marine Corps are certified in epidemiology.

The significance of this rare cancer is best assessed by epidemiologist familiar with drinking water contamination at Camp Lejeune including those who work at Federal agencies such as ATSDR/CDC or the EPA. Unfortunately, until the Marine Corps can provide an accurate number of the men exposed, we may never know the significance of all the cases of male breast cancer from Camp Lejeune we have discovered so far. In fact, Drs. Davis and Clapp have since confirmed that the statement that the expected rate of male breast cancer is 1 in 1,000 is incorrect. They advise that the lifetime risk of any man developing breast cancer by the time he reaches age 85 is 1 in 1,000. As a result this lifetime estimate is not relevant to the population risk of the thousands of young men who lived at Camp Lejeune during peak periods of contamination of the drinking water.

We continue to find men with the disease as time passes. Male breast cancer is typically found in the later stages of the disease and thus more fatal. It is unknown just how many men may have already succumbed to their cancer. We have heard from a few families with deceased servicemembers who succumbed to the disease. One ATSDR future proposal for Camp Lejeune, is a mortality study for the servicemembers exposed at the base. A mortality study would be a potential tool to help us identify deceased victims of male breast cancer for future studies. It is frightening to think of how many men could be out in the general population who were at Camp Lejeune during the drinking water contamination may still be unaware about their potential risk for this deadly disease. Male breast cancer is also a clear indication that our exposures aboard Camp Lejeune have affected our health. Otherwise, why is there such an unusual number of men with the disease whose only commonality is that we all, at one point in our lives, either lived or served aboard Camp Lejeune during the contamination and we all have male breast cancer?

Enclosures

that the chemicals cause the diseases or disorders. Judgment about the quality of each study and additional supporting evidence from other studies are needed. Statistical associations are often represented by numeric estimates, known as "relative risks" or "odds ratios." The estimates describe the relative frequency of disease in groups with higher exposures compared with groups with lower or no exposure. For example, in a study in which individuals are classified as either exposed or unexposed, a relative risk of 2 means that exposed people in the study were twice as likely to develop the disease as people who were not exposed.

As shown in Box 2, all the health outcomes reviewed were placed into one of two categories. The strongest evidence was in the category of *limited/suggestive of an association*, which means that there is some evidence that people who were exposed to TCE or PCE were more likely to have the disease or disorder but that the studies were either few in number or had important limitations. In many cases, the studies could not separate out the effects of individual chemicals because the people were exposed to mixtures. Some of these studies were of highly exposed groups of workers where detection of effects would be expected if present. Such studies might reach conclusions about solvents in general but not about TCE or PCE specifically. For diseases and disorders where the evidence is limited/suggestive of an association, the committee has concluded that the epidemiologic studies give some reason to be concerned that sufficiently high levels of the chemical may cause the disease, but the studies do not provide strong evidence that they actually do so.

The majority of the health outcomes reviewed by the committee were placed into the category of *inadequate/insufficient evidence to determine whether an association exists*, which means that the studies were too few in number, limited in quality, inconsistent, or inconclusive in results to make an informed assessment. It also means that such an association cannot be ruled out. For diseases and disorders in this category, the committee has concluded that the epidemiologic studies cannot tell us whether exposure to the chemicals is associated with the disease or not.

The committee is aware that some health outcomes reported by former residents of the base (for example, male breast cancer and second-generation effects) are not cited in Box 2. The absence of inclusion of specific health outcomes does not mean that such effects are unrelated to exposures from the contaminated water supplies at Camp Lejeune. Rather, those outcomes have not been specifically investigated or, if they were considered, the studies were too small or of insufficient quality to allow conclusions to be drawn.

Review of Epidemiologic Evidence from Community Studies

The committee decided to consider the subset of epidemiologic studies that were conducted in communities exposed to solvents in their water supplies in more detail. Because these studies involved populations and exposure situations that more closely resemble those at Camp Lejeune, some relevant implications might be learned. A few studies reported certain diseases and disorders, such as congenital heart defects, spontaneous abortions, and very low birth weight. However, the studies reported differing effects, so generally they did not confirm each other. In general, the studies had limitations in their design that are unavoidable because of the circumstances that gave rise to them. The limitations include lack of data on levels of contaminants in the water, lack of adequate information about diseases and disorders in the population, and relatively small populations. These factors limit the capacity of such studies to detect associations even if they exist. Limitations in such studies often mean that people in the study communities can only be classified into two groups to reflect exposure to contamination—those exposed and those considered unexposed. Such classification is a crude way to address exposure because it can make it more difficult to detect any effects that might occur. Another common limitation of community studies in general is that they are not able to account for other factors that may affect the likelihood of disease. Furthermore, the studies face the difficult task of addressing diseases that are relatively uncommon. It is harder to find enough cases of uncommon diseases to make comparisons when studying relatively small

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ENCLOSURE B: NRDC LETTER TO ATSDR JULY 23, 2009

NRDC request to continue study of Camp Lejeune exposure and health outcomes

NATURAL RESOURCES DEFENSE COUNCIL
THE EARTH'S BEST DEFENSE

July 23, 2009

Howard Frumkin, MD, MPH, DrPH
Director, National Center for Environmental Health, ATSDR

Thomas Sinks, PhD
Deputy Director, National Center for Environmental Health/ATSDR

Re: Request to continue study of the Camp Lejeune exposure and health outcomes

Dear Drs. Frumkin and Sinks,

We are writing to ask that you continue your important investigations of potential link between historical exposure to contaminated drinking water and adverse health outcomes among the residents of Camp Lejeune, North Carolina.

In response to a request from the U.S. Navy, in 2007, a committee of the National Research Council (NRC) first met to review the scientific evidence on associations between adverse health effects and historical data on prenatal, childhood, and adult exposures to contaminated drinking water at Camp Lejeune, North Carolina. According to the NRC website the committee was asked to assess the strength of evidence in establishing a link or association between exposure to trichloroethylene, tetrachloroethylene, and other drinking water contaminants and each adverse health effect suspected to be associated with such exposure.[1] In the spring of 2009, the committee issued its report, *Contaminated Water Supplies at Camp Lejeune: Assessing Potential Health Effects*, hereafter known as NRC, 2009.

Unfortunately, the report failed to make any definitive statements about the potential link between the highly contaminated drinking water and the diseases reported to be in the Lejeune population, citing "data shortcomings and methodological limitations" (NRC, 2009). Moreover, its hazard evaluation did not take into account that benzene and vinyl chloride were contaminants in the drinking water at Hadnot Point and Tarawa Terrace. Nonetheless, it recommended that the Navy and Marine Corps proceed with decisions about "how to follow up on the evident solvent exposures on the base and their possible health consequences" without waiting for additional study (NRC, 2009). However, without a strong scientific statement of plausibility by the NRC, we are concerned that even the current studies of water contamination and health effects now underway will be cut.

In this letter, we make three main points: First, that the water-modeling efforts by the Centers for Disease Control and Prevention (CDC), and the Agency for Toxic Substances and Disease Registry (ATSDR) are promising and should be continued to completion; second, that further epidemiology can be enlightening particularly if it is done to stratify exposures; third, that

the prevalence of male breast cancer among former and current Camp Lejeune residents should be given particular attention because of its rarity in the general population.

Camp Lejeune water-modeling efforts by ATSDR are promising and should be continued to completion

The NRC report cites a number of barriers to drawing conclusions, including uncertainties in the past exposures, uncertainties in the water models, and gaps in the water monitoring data. However, the report appears to have failed to estimate bounds on these uncertainties, which is a common practice, instead treating them as if they were limitless and therefore insurmountable.

The report also rejects the Lejeune water modeling efforts of the ATSDR, arguing that its models are "cutting edge" and thus not validated, and that its models failed to account for dense nonaqueous-phase liquids (DNAPLs) in the water. However, according to the ATSDR water-modeling team, no one that has studied the contaminated site has reported the presence of DNAPLs at Tarawa Terrace.[2] Oddly, the NRC report failed to provide any evidence of their existence as well, except to say that the geology of the area makes it probable that they exist. The importance of the postulated, but unproved, existence of DNAPLs is that if they exist, then the pump-and-treat remediation currently underway would be inadequate because the DNAPLs are so dense that they would tend to sink deep into aquifers and get trapped in soil. A member of the ATSDR water-modeling team, Professor Mustafa Aral of Georgia Institute of Technology, wrote a 24-page memorandum criticizing the NRC report for this and other technical reasons, and also for dismissing the ATSDR modeling methods as not validated. In fact, the methods used were cutting edge and rigorously scientifically, tailored specifically to the Camp Lejeune site.[3] The reliability of the model's monthly contamination estimates was established by its ability to make predictions that fit the real-world observations in the drinking water system, with an uncertainty that was mathematically described.

For these reasons, we request that ATSDR continue its water-modeling efforts at Camp Lejeune through to completion.

Further epidemiology can be enlightening particularly if it is done to stratify exposures

In a highly unusual event, the NRC report was strongly and publicly criticized by five prominent scientists who have all served as advisors to ATSDR regarding the Camp Lejeune health and contamination issues.[4] Excerpts of their public letter of criticism are here:

- It is our view that the Marines and their families who were exposed to dangerous chemicals in the Camp Lejeune drinking water over several decades deserve to know if this exposure has had an effect on their health. The most direct way to assess this is to conduct valid epidemiologic studies of those who lived or worked there, and we urge ATSDR to continue their efforts to carry these to conclusion.
- We view the water modeling undertaken by ATSDR and its consultants as "state-of-the-art" and worth carrying through to completion so that it can be used in the on-going and proposed health studies. There may be uncertainties about specific levels of exposure for individual households or people, but these can be described in the study results.
- We also agree with the National Toxicology Program that TCE and PCE are "reasonably anticipated to be human carcinogens" and reject the characterization of the evidence as "limited/suggestive" as presented in the NRC report.

- Finally, we disagree with the thrust of the NRC report that it is unlikely that scientifically informative epidemiologic studies of the Camp Lejeune population can be done. The NRC doubts that "definitive" answers can come from any study, but this sets the bar too high – no one study can provide definitive answers, and all studies must be considered in the light of other scientific evidence.

Among the five scientists who signed this letter are some of the most prominent epidemiologists and solvent experts in the world. All are scholars and academics at top-ranked institutes. Dr. Clapp, Boston University, has over thirty years of experience in public health epidemiology and dozens of published scientific articles. Dr. Wartenberg, Robert Wood Johnson Medical School, is one of the nation's foremost experts on TCE epidemiology. Dr. Ozonoff, Boston University, has been the principal investigator of several major studies of waste sites, and is Director of the Superfund Basic Research Program. Drs. Aschengrau and Steingraber are notable scientists with expertise in early life susceptibility to hazardous chemicals. Their criticisms and recommendations should not be dismissed.

We support the recommendation of the above epidemiologists that ATSDR continue its epidemiologic assessment of the health impacts that may be associated with the historical contamination of the drinking and washing water at Camp Lejeune. Specifically, ATSDR should complete the current case-control study of specific birth defects and childhood cancers, complete the reanalysis of the adverse pregnancy outcome study, conduct the mortality study, and conduct the health survey study. By conducting these studies, ATSDR can complete the task that had been asked of the NRC committee: to assess the strength of evidence in establishing a link or association between exposures to trichloroethylene, tetrachloroethylene, and other drinking water contaminants and each adverse health effect suspected to be associated with such exposure.

We suggest that the epidemiology be conducted by stratifying the exposures into several categories, e.g. as high, medium, and low. This should be done based on the monthly estimates of contaminant levels in the Tarawa Terrace and Hadnot Point drinking water systems as well as on the number of years living in Camp Lejeune (i.e. evaluating exposure intensity, exposure duration, and cumulative exposure), and also considering age during exposure period, latency (time from exposure to disease), and age at onset of disease. These data should be easy to collect and would provide discrete numerical values. We further suggest that the study assess the chemical contaminants as a mixture and evaluate whether the contaminants act in a synergistic fashion to increase the risk of disease, and not be limited to trying to discern the contribution of specific single chemicals on the burden of disease. The reasons for our suggestions are as follows: failing to stratify exposure histories will pool the low and high exposure groups and dilute out effects that may only be statistically significant in the high exposure group; and, assessing the water contaminants as a mixture whose constituents may act in a synergistic fashion will avoid the possibility that individual contaminants are small contributors to disease and therefore statistically difficult to distinguish from the baseline exposures to the highly contaminated water.

The prevalence of male breast cancer among former and current Lejeune residents should be given particular attention because of its rarity in the general population

As a result of the tremendous personal effort of Mr. Michael Partain, a former Camp Lejeune resident during his youth, an astounding number of former residents with male breast cancer have been identified. Mr. Partain has reported to me that he has contacted 20 men with male breast cancer who lived, worked, or served at Camp Lejeune. The cluster includes one *in utero*/infant exposure, one child exposure and 18 Marine servicemen. The youngest in the cluster was diagnosed with precancerous tumors in his breast at the age of 38. Mr. Partain was diagnosed at 39. The bulk of the cases were diagnosed between the ages of 47 and 65. The 18 Marines who

were exposed spent anywhere from 3 months to several years at the base. The vast majority of the cases served/lived on the base between the mid-1950's thru the 1960's. Among this cluster, there are only 2-3 men who were on the base and exposed after 1970. Two of the men were over the age of 70 at the time of diagnosis. Most do not have a history of breast cancer in their families. Three of the men with breast cancer report having tested negative for the BRCA gene. Mr. Partain is also tracking three men who have reported breast lumps but have not been diagnosed with anything at this point; they are not included the above count.

We have learned that Dr. Devra Davis has initiated a review of the male breast cancer cases described above, and will conduct an epidemiologic assessment of the likelihood that it is a result of historical exposures to Camp Lejeune drinking water. The prevalence of male breast cancer in the U.S. population is extremely rare, less than 2000 cases per year; only 1% of breast cancer cases overall. The rarity of this disease among the general population, coupled with the unusually large number of cases identified by Mr. Partain in former Camp Lejeune residents, means that this study is very likely to have the statistical power necessary to detect an association with water exposures if one exists. Dr. Davis is the Director of the Center for Environmental Oncology and Professor of Epidemiology at the University of Pittsburgh. Her work is widely recognized and respected. We are eagerly awaiting the findings of Dr. Davis, and recommend that the ATSDR and other involved parties also consider her findings and recommendations when they are made public.

Thank you for your consideration of these comments,

Jennifer Sass, Ph.D.
Senior Scientist, NRDC

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[1] National Research Council. Contaminated Drinking Water at Camp Lejeune. BEST-K-06-08-A. http://www8.nationalacademies.org/cp/ProjectView.aspx?key=BEST-K-06-08-A

[2] Memorandum from Professor Mustafa Aral to Morris Maslia, Project Manager, Exposure-Dose Reconstruction Program, ATSDR, CDC. Response to comments of the NRC report on ATSDR water modeling study. June 30, 2009.

[3] Memorandum from Professor Mustafa Aral to Morris Maslia, Project Manager, Exposure-Dose Reconstruction Program, ATSDR, CDC. Response to comments of the NRC report on ATSDR water modeling study. June 30, 2009.

[4] Scientists fault report on Camp Lejeune contamination. The Pump Handle, June 18, 2009. http://thepumphandle.wordpress.com/2009/06/18/scientists-fault-report-on-camp-lejeune-contamination/

ENCLOSURE C: EMAIL FROM USMC PUBLIC AFFAIRS TO MEDIA OUTLET (REDACTED)

Email from USMC to CNN (Redacted)

----- Original Message -----
From: Dent Maj Eric R <eric.dent@usmc.mil>
To: **********
Sent: Thu Oct 08 15:50:26 2009
Subject: Registry

***** -- did you get my message earlier? Just wondered if you know what the incident of male breast cancer is among US men (1 in 1,000 according to the American Cancer Society)...and a number of 40 out of a min. of 400,000 should yield about 400 cases, correct. Might want to have ***** consider this aspect in future reporting. Also, we'd appreciate if you'd offer the Registry to your viewers www.marines.mil/clsurvey, 1-877-261-9782) so we can reach out to more Marines and their families.

Thanks.
V/R
E
Major Eric Dent, U.S. Marine Corps
* (703) 614-8029 office
* (571) 234-3078 cell

Chairman AKAKA. Thank you very much, Mr. Partain, for your testimony. Dr. Nuckols, will you please begin your testimony.

STATEMENT OF JOHN R. NUCKOLS, PROFESSOR, DEPARTMENT OF ENVIRONMENTAL AND RADIOLOGICAL HEALTH SCIENCES, COLORADO STATE UNIVERSITY

Mr. NUCKOLS. I believe a copy of my full testimony has been submitted by the National Research Council and I have prepared a summary in my own hand. I would be happy to share it with the Committee if you would like a paper copy.

Chairman AKAKA. Thank you.

Mr. NUCKOLS. In 1984, evidence of contamination of the water distribution system serving the Tarawa Terrace area within Camp Lejeune, NC, was discovered. It was one of six water distribution systems serving different areas on the camp.

Since that time, contamination of another water distribution system serving the Hadnot Point area and contamination of the natural source for all water systems on the base, the Castle-Hayne Aquifer, has been documented. Many former residents and employees of the base have raised questions about whether health problems they or members of their families have experienced could be related to exposure to the contaminated water.

At the request of Congress, the Navy sponsored a study by committee of the National Research Council to review the scientific evidence on associations between adverse health effects and historical data on pre-natal, childhood and adult exposures to contaminated drinking water at Camp Lejeune.

In September 2007, the NRC convened a committee of experts in epidemiology, toxicology, exposure analysis, environmental health,

groundwater modeling, biostatistics, and risk assessment for this purpose. In or about August 2009, the NRC review document, *Contaminated Water Supplies at Camp Lejeune, Assessing Potential Health Effects*, was published.

I served as one of the volunteers on the NRC committee, primarily as the chair of a subcommittee that was responsible for chapter two, Exposure to Contaminants in Water Supply at Camp Lejeune. In that chapter, we described the scenarios of exposure to contaminants in the water supply and identified gaps in understanding of exposure to people who lived or worked there.

There were three other working subcommittees, epidemiology, toxicology and risk communication. The internal process used by the committee was as follows: we gathered information on the chemicals present in the Camp Lejeune water supply, including magnitude of contamination, geographic extent and timing; we ascertained reported health concerns from people who lived or worked at Camp Lejeune.

Based on published toxicology and epidemiology studies, we gathered scientific evidence of causation or association of diseases with the predominant chemical contaminants that were present in the water supply and compared these to health outcomes reported by the affected population. We ascertained whether conclusions could be drawn that any adverse health outcomes could be attributed to the water contaminants at Camp Lejeune and whether additional health studies would be more likely to provide such a definitive conclusion. And finally, we made recommendations as to further actions concerning studies of adverse health effects and water contamination at Camp Lejeune.

In short, these recommendations were that new health effects studies of persons who lived or worked at Camp Lejeune and their families should be undertaken only if their feasibility and promise of providing substantial improved knowledge are established in advance.

Second and foremost, the decisions regarding the appropriate policy response to health concerns about exposure to contaminated water at Camp Lejeune should not be delayed or await the results of epidemiological studies that are in progress or planned. My testimony today is derived strictly from the content of the report by the NRC Committee on Contaminated Drinking Water at Camp Lejeune, which I fully support.

Thank you for your invitation and your attention.

[The prepared statement of Mr. Nuckols follows:]

PREPARED STATEMENT OF JOHN R. NUCKOLS, PH.D., PROFESSOR, DEPARTMENT OF ENVIRONMENTAL AND RADIOLOGICAL HEALTH SCIENCES, COLORADO STATE UNIVERSITY, FORT COLLINS, CO

Good morning Mr. Chairman and Members of the Committee. My name is John Nuckols. I am a professor in the Department of Environmental and Radiological Health Sciences at Colorado State University. I was a member of the Committee on Contaminated Drinking Water at Camp Lejeune, a committee of the National Research Council. The Research Council is the operating arm of the National Academy of Sciences and the National Academy of Engineering. I'm pleased to appear before you today to discuss our committee's recent report Contaminated Water Supplies at Camp Lejeune—Assessing Potential Health Effects.

At the request of Congress, the Navy sponsored a study by a committee of the Research Council to review the scientific evidence on associations between adverse health effects and historical data on prenatal, childhood, and adult exposures to con-

taminated drinking water at Camp Lejeune. For each health effect reviewed, the Committee was asked to evaluate the available scientific literature concerning evidence of a statistical association between contaminants found or likely to have been in the water supply at Camp Lejeune and adverse health effects. The Committee was also asked to review whether there was any evidence to suggest any causal relationships between the exposures and health outcomes.

Let me begin with the Research Council study process. As you are aware, the Research Council is a non-governmental institution originally chartered by President Lincoln to provide independent scientific advice to the Nation. That scientific advice is usually in the form of consensus reports produced by expert, unpaid committees. In the case of the Camp Lejeune study, the Committee was comprised of 13 members with expertise in epidemiology, toxicology, exposure assessment, environmental engineering, clinical medicine, biostatistics, and risk assessment. The Committee's report was developed through an established study process designed to ensure the Committee and the report were free from actual or potential conflicts of interests, were balanced for any biases, and were independent of oversight from the sponsoring agency.

Our committee reviewed the relevant scientific literature, heard from experts, met with former residents and workers to hear their concerns, and deliberated for two years. Once the Committee reached its consensus, but prior to the report being released, the draft report was subjected to a formal, peer-review process overseen by the National Academies Report Review Committee. The report was released only after the Review Committee was satisfied that all review comments had been appropriately considered and addressed.

Copies of the final report were sent to the sponsor immediately prior to public release. The sponsor was not provided an opportunity to review the report or any portions of the report, or to suggest changes to the NRC report prior to its release.

To address the specific charge of the Camp Lejeune study, our committee divided the review into two major categories: (1) evaluating the potential for exposure of former residents and workers to contaminants in the water supply source and distribution systems at Camp Lejeune, in particular the Tarawa Terrace and Hadnot Point water-supply systems; and (2) evaluating the potential health effects associated with these water contaminants based on epidemiological and toxicological evidence. The two assessments were then considered together to ascertain whether conclusions could be drawn about whether any adverse health outcomes could be attributed to the water contamination.

In reviewing the available exposure information, the Committee agreed with previous assessments that the primary contaminant of the Tarawa Terrace water system was perchloroethylene (PCE), a solvent that was improperly disposed of by an off-base dry-cleaner. Other contaminants were also identified as being of concern, including trichloroethylene (TCE), dichloroethylene, benzene, toluene, and vinyl chloride. Sophisticated computer modeling techniques were used by the Agency for Toxic Substances and Disease Registry (ATSDR) to make predictions about the monthly concentrations of PCE to which residents of Tarawa Terrace were exposed. The Committee questioned the degree of accuracy that could be achieved from the modeling because no contaminant measurements were available for the first 30 years of the contamination, so it was not possible to verify model predictions. In addition, assumptions had to be made about how the water system was operating over the potential exposure period, as no records were available at the time of the development of the model reviewed by the NRC committee. Given these uncertainties, the Committee concluded that the Tarawa Terrace modeling predictions should only be used to provide general estimates of the timeframe and magnitude of exposure.

The contamination of the Hadnot Point water system was more complex than Tarawa Terrace. There were multiple sources of pollutants from on-base activities, such as storage and disposal practices. To date, no groundwater modeling has been performed for this water system. Based on the records the Committee reviewed, trichloroethylene appeared to be the primary contaminant of concern, but other contaminants were also detected in the water supply, including dichloroethylene, methylene chloride, and vinyl chloride. Because groundwater modeling of the Hadnot Point system will be fraught with considerable difficulties and uncertainties (similar to, but much more complex than those associated with the Tarawa Terrace models), the Committee recommended that simpler models be used to assess the extent of water supply contamination and potential exposures. Simpler models will not reduce the uncertainty associated with the estimates, but they have the advantage of providing a broad picture of the timeframe and magnitude of exposure with less resources than complex modeling exercises. More complex predictive models for exposure assessment should be used only if justified by more straightforward analytical methods.

To evaluate the potential health effects to exposed residents, the Committee undertook four kinds of reviews to determine what kinds of diseases or disorders have been found to result from exposure to TCE and PCE. The first was a review of epidemiologic studies of solvents and their effects, including studies in occupational and industrial settings and community studies. The second was a review of epidemiologic studies of other communities with solvent-contaminated water supplies. The third was a review of toxicologic studies conducted in animals and humans to test for health effects. And the fourth was a review of studies conducted specifically on the Camp Lejeune population.

For the first review of epidemiologic studies, we used a categorization process established by the Institute of Medicine to evaluate risks to veterans of the Vietnam War and Gulf War. The Institute's approach is to evaluate the available epidemiologic literature involving exposures to specific chemicals in any setting, but mainly occupational settings, to determine whether a "statistical association" exists between specific chemicals and diseases and disorders. A statistical association means that people who are exposed to the chemicals are more likely to have or develop the disease or disorder than people who are not exposed. A statistical association, however, does not establish that the chemicals cause the disease or disorders. On the basis of the Committee's review, all the health outcomes were placed into one of two categories. The strongest evidence was in the category of limited/suggestive of an association, which means there is some evidence that people who were exposed to TCE or PCE were more likely to have the disease or disorder but that the studies were either few in number or had important limitations. In many cases, the study subjects were exposed to multiple chemicals, so it was not possible to separate out the effects of individual chemicals. Fourteen of the 59 outcomes reviewed by the Committee were placed in this category. The other 35 health outcomes reviewed by the Committee were placed in the category of inadequate/insufficient evidence to determine whether an association exists, which means that the studies were too few in number, limited in quality, inconsistent, or inclusive in results to make an informed assessment. It also means that such an association cannot be ruled out.

The Committee decided to consider the subset of epidemiologic studies that were conducted in communities exposed to solvents in their water supplies in more detail. We felt these studies involved populations and exposure situations that more closely resemble those at Camp Lejeune. Overall, the Committee found the evidence from this subset of studies to be inconsistent and that there were a variety of limitations with the studies that did not allow any conclusions to be drawn about what effects might be related to the exposures. Some of the limitations were a lack of data on the levels of contaminants in the water, lack of adequate information about diseases and disorders in the population, and relatively small populations. These factors limit the capacity of such studies to detect associations.

In animal experiments, a variety of adverse health effects were observed following relatively high exposures to TCE and PCE. It is difficult to determine whether the health effects observed in laboratory animals are predictive of effects in humans. There are differences in how TCE and PCE are handled in the body by rodents and humans that affect biological responses. However, it is clear that TCE and PCE do have toxic effects in laboratory animals and that some of them may be of concern to humans. Similar health effects found in epidemiology and toxicologic studies were kidney cancer, liver and kidney toxicity, neurotoxicity, and immunotoxicity.

Only a few studies have been conducted on the Camp Lejeune population, and these have focused on health effects in people who were exposed as children or while their mothers were pregnant with them. Two studies performed by ATSDR did not find any clear associations between birth outcomes (mean birth weight, preterm birth, or small for gestation age). However, a comparison of subgroups within the Tarawa Terrace population found a weak association between PCE exposure and small for gestational age children of women over the age of 35 or who had prior miscarriages. The findings from these evaluations are no longer valid. After the evaluations were completed, ATSDR discovered that a residential area it classified as unexposed received water from the Hadnot Point system, so the study results must be reanalyzed to correct for this mistake in classification. ATSDR also has a study underway on prenatal exposure to water-supply contaminants and birth defects and childhood cancer. The outcomes in the study are rare, and given the number of study participants, it appears that the statistical power of the study could limit its ability to detect associations.

The Committee also looked into the feasibility and utility of future studies of the Camp Lejeune population, including a health survey and epidemiologic studies of mortality and morbidity in the population. The Committee noted many difficulties with performing the studies, such as the difficulty with identifying, locating, and recruiting the study participants and obtaining reliable health information on them

in an efficient manner. It is questionable whether there will be enough participants to ensure there is adequate statistical power to detect associations, and the Committee was concerned about the possibility of bias in the survey and studies, as people who have experienced disease or illness are more likely to participate.

After reviewing the preliminary plans and feasibility assessments, the Committee concluded that most questions about whether exposures at Camp Lejeune resulted in adverse health effects cannot be answered definitively with further scientific study. There are two reasons for this. First, it would be extremely difficult, if not impossible, to reliably estimate the historical exposures experienced by people at the base. Second, it will be difficult to detect any increases in the rate of diseases or disorders in the study population. Most of the health effects of concern are relatively rare, which means that very large numbers of people are needed to detect increased cases. Although the total number of people who lived at Camp Lejeune while the Tarawa Terrace and Hadnot Point water supplies were contaminated was sizable, the population is still unlikely to be large enough to detect effects. Another factor is that the people tended to live on the base for a relatively short period of time, making it difficult to rule out other exposures or factors that could have contributed to the disease or illness. Most chronic diseases are thought to have a latency period of years, if not decades, which means that exposure needs to be assessed over this same time period. All these factors make it unlikely that the proposed studies, even if the notable uncertainties about feasibility are resolved favorably, will produce a result of sufficient certainty to resolve the question of whether Camp Lejeune residents suffered adverse health effects (especially chronic diseases) from exposure to contaminated water at Camp Lejeune. Thus, our committee's conclusion was that there is no scientific justification for the Navy and Marine Corps to wait for the results of additional health studies before making decisions about how to follow up on the evident solvent exposures on the base and their possible health consequences. The services should undertake the assessments they deem appropriate to determine how to respond in light of the available information.

With that, I would once again like to thank you for inviting me to testify before this Committee, and I look forward to your questions.

RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY HON. DANIEL K. AKAKA TO JOHN R. NUCKOLS, PH.D., PROFESSOR, COLORADO STATE UNIVERSITY, MEMBER, COMMITTEE ON CONTAMINATED DRINKING WATER AT CAMP LEJEUNE

Question 1. You heard testimony from Michael Partain during the hearing. He stated that he has identified 40 men from Camp Lejeune who have breast cancer. Did the National Research Council consider that when they wrote their report? Does that number by itself raise any red flags with you? Is that something that you think merits further investigation?

Question 2. You stated that ATSDR has a study underway on prenatal exposure to water-supply contaminants and birth defects and childhood cancer, but that the statistical power of the study could limit its ability to detect associations. Is there a better way, or better study to undertake, to determine a possible connection between water-supply contaminants and birth defects and childhood cancer?

Question 3. What steps did the National Research Council and the ATSDR take in determining prenatal exposure to water-supply contaminants?

Question 4. What exactly was the charter of the National Research Council when asked to conduct your study?

Question 5. How did the National Research Council select scientific studies to review? How many of the studies did you review? How rigorous was your review, and how did you review them (e.g. did everyone on the Committee read the same studies, did one person read one and brief the rest of the group, etc.)?

[The Committee had not received the requested information by press time.]

Chairman AKAKA. Thank you very much, Dr. Nuckols. Now we will hear the testimony from Ms. Pennington.

STATEMENT OF STACY PENNINGTON, SISTER OF SSG. STEVEN GREGORY OCHS, IRAQI OPERATION FREEDOM AND OPERATION ENDURING FREEDOM VETERAN

Ms. PENNINGTON. Aloha, Honorable Chairman Akaka.

Chairman AKAKA. Aloha.

Ms. PENNINGTON. And honorable Members of the Committee, good morning. It is an honor to be sitting before the U.S. Senate Committee on Veterans' Affairs. Thank you for your leadership in acknowledging the exposures happening to our troops.

I have been asked to speak to you from a victim's standpoint of the effect of exposure to dangerous toxins produced by burn pits that are used to dispose of such items as medical waste, fuel, plastic, vehicles, trash and ammunition. I sit here in front of you with a heavy heart to share the stories of two families who know how it feels to have a burning pit in our souls.

My brother, SSG. Steven Gregory Ochs chose the military as his career, serving our country for 14 years. SSG. Matt Bumpus served his country for 8 years and 9 months. Both were called to fight in Operation Iraqi Freedom. Staff Sergeant Ochs served three tours in 12- to 15-month intervals from 2003 to 2007, and Staff Sergeant Bumpus served his tour onset of the war in 2003. Both of these brave soldiers you see before you dodged bullets, mortar attacks, roadside bombs, and suicide bombers, yet eventually their tours would take their lives.

The ultimate sacrifice of a soldier for his country is death. However, their deaths did not show up in the manner you may assume. In Balad is the site of the infamous, enormous burn pit that has been called by Darrin L. Curtis, lieutenant colonel of the U.S. Air Force of Bioenvironmental Engineering and Flight Commander, the worst environmental site he had ever visited.

Staff Sergeant Ochs and Staff Sergeant Bumpus were both stationed in Balad and war, as strategic as it is, followed them home. Death lay dormant in their blood and waited for them to return safely home and into the arms of their loved ones. And like every silent ticking time bomb, it eventually exploded.

On September 28, just months after Steve's return home from his third tour, he was diagnosed with acute myeloid leukemia, also known as AML. He spent the next 10 months as a patient, more like a resident, at Duke University Hospital. Doctors at Duke said his aggressive form of AML was definitely chemically induced and like Steve, both agreed it was due to the exposures he experienced while in Afghanistan and Iraq.

However, the doctors refused to go on record, citing as the reason that they could not prove it. The aggressive AML that Steve endured was similar to bullets ricocheting in the body, causing tortuous pain. The graphic images embedded in my mind are Steve's last screams for air as he was rushed into ICU. Forgive me.

Steve waved goodbye to my husband. Steve, with very little strength, his last words to me were, I love you, Sis. And my mom kissed his forehead and said, we will see you when they get you comfortable. Not 5 minutes later, while we were in ICU waiting room, the nurse came in to tell us that Steve went into cardiac arrest and they were working to revive him now. My mom ran into ICU. She fell to her knees as she realized her son was dying.

Screams filled the air as we begged God to keep Steve here with us. We know Steve heard us as tears were in Steve's eyes. Doctors and nurses pumped on Steve's chest trying to revive him, but I

knew immediately he was gone. His spirit that surrounded my dear sweet little brother of 32 years old, was gone.

We were left alone with Steve's body for hours as we were all in pure shock. My mom looked upon my brother's face and wiped away the tears puddled in his eyes. And at that very moment, our lives were changed forever. Steve died on July 12, 2008.

Two weeks later on the opposite side of the coast, Staff Sergeant Bumpus would succumb to the same fate. For Staff Sergeant Bumpus, the ticking time bomb exploded with a vengeance on July 31, 2006. Matt was rushed to the hospital by ambulance with acute appendicitis. In Matt's own words, "the next thing I remember is hearing that I had been diagnosed with AML."

Doctors declared that there was chromosome damage due to exposures he must have come in contact with while in Iraq. Matt ended his prestigious service to the Army one short year before the war zone—chemical warfare showed signs of its presence. As if this was not enough suffering, Staff Sergeant Bumpus' family was met by the VA with harsh claims of denial to benefits. This battle continues to this day as Lisa, Staff Sergeant Bumpus' wife, is left alone with two small children to raise with no military or VA benefits for her family.

The aggressive assault of the AML in Matt's body was taking claim. Jo, Matt's mother, recalls the haunted look in Matt's eyes as he revealed to her the AML invasion was back. Matt's mother never forgot the discouragement and sadness that overwhelmed Matt as he realized that promises he made to his wife and children—to provide for his family, to love and protect them—that his sacred word was broken.

He knew now that the battle was over and he would be leaving his family behind. Tuesday, July 29, 2008, Matt once again entered the hospital with fever and septic infection that discharged throughout his entire body. Doctors notified the family that it would just be days before his demise.

Matt was heavily sedated as the pain and incubation was unbearable. Nate, Matt's 10-year-old son, bravely entered his father's room to lay on his daddy's chest to say his final goodbye. Nate curled up by his dad and cried and cried and despite Matt's heavy sedation, Matt too was crying. Matt being a devoted Christian, appropriately passed away on a Sunday morning surrounded by his wife, mother, father, sister as they expressed to Matt their everlasting love.

They too were in shock and stayed with Matt's body as they realized and were overwhelmed that Matt was not coming home. Matt died on August 3, 2008. You have to know that while serving in Iraq, both of these soldiers complained of ailments such as colds, major fatigue, headaches, sinus problems, loss of hearing, and Staff Sergeant Ochs contracted TB while in Afghanistan due to the massive exposure to dead bodies.

Both men were of strong stature, standing over six feet tall, weighing over 200 pounds and both men were the perfect image of Army-strong soldiers. Two men, brave, who served their country courageously and committed to the cause, dedicated to our country and entrusted the military.

Grief, sadness, and depression have gripped our entire families. Their wives are emotionally broken and incomplete, their mothers are emotionally unstable and engulfed with grief and their fathers are lost; and worst of all, their children are fatherless.

Sadly, Steve and Matt are not alone. Laura Bumpus and I have spoken to over hundreds of families suffering the same fate. We are aware of hundreds more suffering similar ailments. These men are casualties of war. They deserve the respect of that fact to reflect on the Army records.

My family, the Ochs family, proudly display our gold pin presented to us by Steve's commander at his funeral. Unfortunately, the Bumpus' family does not have that same privilege and this too must be rectified. We are proud military families and we will continue to be in the future. And you have to know, we both have members currently serving this country now. We deserve to display the gold flag in homage of our beloved. This too has been a benefit denied to both of our families.

We would like to thank the Department of Defense for recently installing the necessary incinerators at the Balad base. However, we are concerned, as other toxic burn pits continue burning 24/7 throughout Iraq and Afghanistan and we ask the Committee for your support to correct the problem.

In conclusion, our families will continue to live with emotional battle scars caused by the terminal injuries our beloved ones suffered as a result of the exposures of burn pits. I assure you it is a heavy cross to bear. Our wish is for this Committee to begin the actions it takes to stop this nightmare. You have the power to save our courageous heroes who serve our country and who protect me and who protect you.

Thank you for your time in hearing our voices.

[The prepared statement of Ms. Pennington follows:]

PREPARED STATEMENT OF STACY PENNINGTON, SISTER OF SSG STEVEN GREGORY OCHS, IRAQI OPERATION FREEDOM AND OPERATION ENDURING FREEDOM VETERAN AND REPRESENTING SSG MATT BUMPUS, IRAQI OPERATION FREEDOM VETERAN

Honorable Chairman Akaka and Honorable Members of the Committee: Good Morning. It is an honor to be sitting before the U.S. Senate Committee on Veterans' Affairs. Thank you for your leadership acknowledging the exposures happening to our troops. My name is Stacy Pennington and I was asked to speak to you from a victim's standpoint of the affects of exposure to dangerous toxins produced by burn pits that are used to dispose of such items as medical waste, fuel, plastic, vehicles, trash and ammunition. I sit here in front of you with heavy heart to share the stories of two families who know how it feels to have a "burning pit" in our souls.

My brother, SSG Steven Gregory Ochs, chose the military as his career serving our country for 14 years. SSG Matt Bumpus served his country for 8 years and 9 months. Both were called to fight in Operation Iraqi Freedom. SSG Ochs served 3 tours in 12–15 month intervals from 2003–2007 and SSG Bumpus served his tour onset of the war in 2003.

Both of these brave soldiers you see before you dodged bullets, mortar attacks, road side bombs and suicide bombers. Eventually their tours of duty would take their lives. The ultimate sacrifice for a soldier, for his country is death. However, their deaths did not show up in the manner you may assume.

In Balad is the site of the infamous enormous burn pit that has been called by Darrin L. Curtis, Lt. Col., USAF and Bioenvironmental Engineering Flight Commander as "the worst environmental site" he had ever visited. SSG Ochs and SSG Bumpus were both stationed in Balad and war as strategic as it is followed them home. Death lay dormant in their blood and waited for them to return safely home and into the arms of their loved ones. Like every silent ticking time bomb, it eventually exploded.

On September 28, 2007, just months after Steve's return home from his 3rd tour, he was diagnosed with Acute Myeloid Leukemia, also known as AML. He spent the next 10 months as a patient, more like a resident, at Duke University Hospital. Doctors at Duke said his aggressive form of AML was definitely chemically induced and like Steve both agreed it was due to the exposures he experienced while in Iraq and Afghanistan. However, the doctors refused to go on record citing as the reason that they could not prove it.

The aggressive AML that Steve endured was similar to bullets ricocheting in the body causing torturous pain. The graphic images embedded in my mind are of Steve's last screams for air as he was rushed into ICU. Steve waved goodbye to my husband. Steve with very little strength said, "I love you sis" and my Mom kissed his forehead and said we will see you when they get you comfortable. 5 minutes later while in the ICU waiting room the nurse came in to tell us Steve went into cardiac arrest and they were working on him now. My mom ran into ICU; fell to her knees as she realized her son was dying. Screams filled the air as we begged God to keep Steve here with us. We know Steve heard us as tears were in Steve's eyes. Doctors and nurses pumped on Steve's chest trying to revive him. But I knew immediately he was gone. His spirit that surrounded my dear sweet brother was gone. We were left alone with Steve's body for hours as we were all in pure shock. My mom looked upon my brother's face and wiped away the tears puddled in his eyes. And at that very moment our lives were changed forever. Steve died on July 12, 2008. Two weeks later on the opposite side of the coast SSG Bumpus would succumb to the same fate.

For SSG Bumpus, the ticking time bomb exploded with a vengeance on July 31, 2006. Matt was rushed to the hospital by ambulance with acute appendicitis. In Matt's own words I quote, "the next thing I remember is hearing that I had been diagnosed with AML." Doctors declared that there was chromosome damage due to exposures he must have come in contact with while in Iraq. Matt ended his prestigious service to the Army one short year before the war zone chemical warfare showed signs of its presence.

As if this was not enough suffering, SSG Bumpus' family was met by the VA with harsh claims of denial to benefits. This battle continues to this day as Lisa, SSG Bumpus' wife, is left alone with two small children to raise with no VA or military benefits for her family.

The aggressive assault of the AML in Matt's body was taking claim. Jo, Matt's mother recalls the haunted look in Matt's eyes as he revealed to her that the AML invasion was back. Matt's mother will never forget the discouragement and sadness that overwhelmed Matt as the realization that promises he made to his wife and children to provide for his family, to love and protect them and that his sacred word would be broken. He knew now that the battle was over and he would be leaving his family behind. Tuesday, July 29, 2008, Matt once again entered the hospital with fever and septic infection that discharged throughout his body. Doctors notified the family that it would just be days before his demise.

Matt was heavily sedated as the pain and incubation was unbearable. Nate, Matt's 10 year old son, bravely entered his father's hospital room to lay on his Daddy's chest as he said his final goodbye. Nate curled up by his Dad and cried and cried. Despite Matt's heavy sedation, Matt too was crying. Matt being a devoted Christian appropriately passed away on a Sunday morning surrounded by his wife, mother, father and sister as they expressed to Matt their everlasting love. They too, were in shock and stayed with Matt's body as the realization overwhelmed them that Matt would not be going home. Matt died on August 3, 2008.

While serving in Iraq both soldiers complained of ailments from colds, major fatigue, headaches, sinus problems, loss of hearing, and SSG Ochs contracted TB while is Afghanistan due to exposures to masses of dead bodies. Steve and Matt were men of large strong stature, standing over 6 feet tall, weighing over 200 pounds and both men were the perfect image of Army strong soldiers. Two brave men, who served their country courageously, committed to the cause, dedicated to our country and entrusted the military.

Grief, sadness and depression have gripped our entire families. Their wives are emotionally broken and incomplete. Their mother's are emotionally unstable and engulfed with grief. Their father's are lost. Their children are fatherless.

Sadly, Steve and Matt are not alone. Laura Bumpus and I have spoken to over a hundred families suffering the same fate. We are aware of hundreds more suffering similar ailments. These men are casualties of war. They deserve the respect of this fact to reflect in their Army records. My family, the Ochs family, proudly displays our Gold Star pin presented to us during Steve's funeral by his Commander. Unfortunately, SSG Bumpus' family does not have this same privilege. This must be rectified. We are proud military families and will continue to be in the fu-

ture. We both have family members currently serving our country. We deserve to display the gold flag in homage of our beloved. This too has been a benefit that both of our families have been denied.

In conclusion, our families will continue to live with the emotional battle scares caused by the terminal injuries our loved ones suffered as a result of the exposures of the burn pits. I assure you it is a heavy cross to bare. Our wish is for this Committee to begin the actions it needs to take to stop this nightmare. You have the power to save our courageous heroes who serve our country and who protect me and who protect you.

Thank you for your time and for hearing our voices.

Chairman AKAKA. Thank you very much, Ms. Pennington, for your testimony. Dr. Miller, your testimony, please.

STATEMENT OF ROBERT F. MILLER, M.D., ASSOCIATE PROFESSOR OF PULMONARY AND CRITICAL CARE MEDICINE, VANDERBILT UNIVERSITY MEDICAL CENTER

Dr. MILLER. Chairman Akaka, Ranking Member Burr, and Members of the Committee, I thank you for the opportunity to testify today. My comments will focus on a group of U.S. soldiers with permanent respiratory impairment following service in Iraq and Afghanistan.

In early 2003, 20,000 soldiers from the 101st Airborne out of Fort Campbell, KY, were deployed to Northern Iraq as part of Operation Iraqi Freedom. In June 2003, opposing forces set fire to the Mishraq Sulfur Mine approximately 25 kilometers from Camp Q West, a major military supply air strip and primary area of deployment for the 101st Airborne.

At that time, the Mishraq Sulfur Mine was the largest sulfur mine in the world. It burned for over 4 weeks and caused the release of 42 million pounds of sulfur dioxide per day. This represents the largest manmade release of sulfur dioxide on record. Satellite imaging documented that the sulfur dioxide plume extended north and south over the city of Mosul and Camp Q West.

Sulfur dioxide is the gas that you and I associate with striking a match. It is a potent lung toxin and has been shown to cause lung injury at levels as low as .1 part per million. Our soldiers were exposed to levels many times higher than this. Skin, eye and airway irritation reported by soldiers in the area suggests levels in excess of 50 parts per million. Random sampling by the U.S. Army documented toxic levels of over 100 parts per million.

Most of the 101st Airborne deployed in early 2003 returned to Fort Campbell in 2004. This is when Vanderbilt University began receiving referrals from providers at Fort Campbell asking for assistance in evaluating soldiers complaining of shortness of breath on exertion, soldiers who could no longer pass physical training—physical fitness testing.

The typical soldier had been able to complete a two-mile run in exemplary time within regulation. Now these soldiers had to walk much of the course. In almost all cases, standard respiratory evaluations had been normal. X-rays, chest CT scans, and pulmonary function testing were all normal or nearly normal.

None of these routine tests explained the cause for the soldiers' limitation. Vanderbilt physicians ultimately referred patients for surgical lung biopsy and I must emphasize that it is very uncommon to perform a surgical biopsy to evaluate shortness of breath

when standard testing is normal. You just do not send a patient to the operating room for a surgical lung biopsy when pulmonary function tests and x-rays fail to indicate some type of cause.

But the degree of exercise limitation and sulfur dioxide exposure were compelling enough for us to apply this aggressive approach. In almost every case, surgical biopsy showed constrictive bronchiolitis, a condition associated with damage or destruction affecting more than 50 percent of the small airways of the lungs.

This abnormality causes pulmonary limitation, but is not detectable on x-ray. Between 2004 and 2009, Vanderbilt physicians performed surgical biopsies on 45 of 70 soldiers referred for unexplained shortness of breath. All of the biopsies except one demonstrated some form of bronchiolitis. This condition has no known treatment and has resulted in Med boards from almost all of those affected.

While the majority of patients diagnosed with constrictive bronchiolitis were exposed to sulfur dioxide from the sulfur mine fire, 25 percent of those biopsies served at a time or a place incompatible with this exposure. They had similar exercise limitation, test results and biopsies showing bronchiolitis, but they did not report any extraordinary exposures that would distinguish them from other soldiers. However, almost all reported inhalational exposures that were common to the Iraqi experience, including fumes from burn pits, burning human waste, fires and dust from combat, burning oil and diesel exhaust.

Consider the example of a 42-year-old physician who was deployed to Northern Iraq in 2007. She had been an avid marathon runner prior to deployment and ran regularly during 8 months—her 8 months tour of duty. Upon return, she was too short of breadth to run a mile. Her x-rays, pulmonary function tests were normal and her lung biopsy showed constrictive bronchiolitis, the same abnormalities seen in the other soldiers. She remains limited and now finds it difficult to climb stairs and walk up inclines.

Up to this point, almost all of the soldiers diagnosed with constrictive bronchiolitis have been referred from Fort Campbell, but we have received a number of communications from soldiers and providers throughout the country, leading us to believe that this condition is present but not being diagnosed at other facilities.

As noted previously, this diagnosis can only be established by surgical lung biopsy and most clinicians would hesitate to recommend this procedure. Military and VA officials have had a difficult time rating disability in this population. In most cases, the affected soldiers are comfortable at rest and are able to perform their activities of daily living. They have normal or near normal pulmonary function tests, but at the same time, they cannot meet the physical training requirements and are considered unfit for duty.

This unique circumstance has challenged those who want to determine disability. Pulmonary function testing is the standard for rating respiratory problems, but how does one rate a soldier who is too short of breath to serve yet has a normal pulmonary function test? Unfortunately, the ratings applied thus far have not been standardized. We have seen many examples of a soldier receiving a rating from the U.S. Army only to have it downgraded by the VA.

More research is needed to understand the cause and prevention of this disease. There is little doubt that the cause of bronchiolitis and those exposed to the Mishraq Sulfur Mine fire was due to inhalational toxin. There is also little doubt that those not exposed to sulfur fires suffer from a disease caused by toxic inhalation.

We must determine what these other toxins are to prevent those serving from being exposed. We must also consider baseline pulmonary function testing prior to deployment, knowing that our soldiers too often encounter inhalational toxins. And finally, I urge the development of standards for evaluating this condition that I have described today.

Thank you for your attention.

[The prepared statement of Dr. Miller follows:]

PREPARED STATEMENT OF ROBERT F. MILLER, M.D., ASSOCIATE PROFESSOR OF PULMONARY AND CRITICAL CARE MEDICINE, VANDERBILT UNIVERSITY MEDICAL CENTER

Chairman Akaka, Ranking Member Burr, and Members of the Committee, I thank you for the opportunity to testify today. My comments will focus on a group of United States soldiers with permanent respiratory impairment following service in Iraq and Afghanistan.

BACKGROUND

In early 2003, 20,000 soldiers from the 101st Airborne from Ft. Campbell, KY were deployed to northern Iraq as part of Operation Iraqi Freedom. In June 2003, opposing forces set fire to the Mishraq Sulfur Mine, approximately 25 miles north the Qayyarah Airfield West (Camp Q West), a major military supply airstrip and the primary area of deployment for the 101st Airborne.

At that time, the Mishraq Sulfur Mine was the largest sulfur mine in the world. It burned for over 4 weeks and caused the release of 42 million pounds of sulfur dioxide (SO2) per day. This represents the largest man-made release of SO2 on record. Satellite imaging documented that the SO2 plume extended in a Southeast direction over the city of Mosul and Camp Q West.

SO2 is the gas that you and I would associate with striking a match. It is a potent lung toxin and has been shown to cause lung injury at levels as low as 0.1 PPM. Our soldiers were exposed to levels many times higher than this. The skin, eye and airway injury irritation noted by almost everyone in the area suggests levels in excess of 50 PPM. Random sampling by the US Army documented toxic levels of SO2.

CLINICAL PRESENTATIONS

Most of the 101st Airborne deployed in early 2003 returned to Ft. Campbell in early 2004. This is when Vanderbilt began to receive referrals from providers at Fort Campbell, asking for assistance in evaluating soldiers who complained of shortness of breath on exertion and could no longer pass physical fitness testing. The typical soldier previously had been able to complete a two mile run within regulation time, but now had to walk much of the course. In almost all cases, standard respiratory evaluations obtained at Fort Campbell had been normal, including chest x-rays, chest CT scans and pulmonary function testing. None of these routine tests could explain the cause for the soldiers' limitations.

Vanderbilt physicians ultimately referred patients for surgical lung biopsy. I must emphasize that it is very uncommon to obtain surgical biopsies to evaluate shortness of breath with exertion when standard testing is normal. But the degree of exercise limitation and SO2 exposure were compelling enough for us to apply an aggressive approach. In almost every case, surgical biopsy showed constrictive bronchiolitis, a condition associated with damage or destruction affecting more than 50% of small airways. This abnormality causes pulmonary limitations, but is not detectable on x-ray.

Between 2004 and 2009 Vanderbilt physicians performed surgical biopsies on 45 of 70 soldiers referred for unexplained shortness of breath on exertion. All of the biopsies except one demonstrated some form of bronchiolitis. This condition has no known treatment and has resulted in medical boards for almost all of those affected.

While the majority of the patients diagnosed with constrictive bronchiolitis were exposed to SO2 from the Mishraq sulfur mine fire, 25% of those biopsied served at a time or place incompatible with this exposure. They had similar exercise limita-

tions, test results, and biopsies showing bronchiolitis, but they did not report any extraordinary exposures that would distinguish them from other soldiers. However, almost all reported inhalational exposures that were common to the Iraqi combat experience. These include fumes from burn pits burning human waste, fires and dust from combat, burning oil and diesel exhaust.

Consider the example of a 42 year-old physician who was deployed to northern Iraq in 2007. She had been an avid marathon runner prior to deployment and ran regularly during her 8 months in Iraq. Upon return, she was too short of breath to run a mile. Her X-rays and pulmonary function testing were normal and she ultimately had a surgical lung biopsy showing constrictive bronchiolitis, the same abnormality seen in most of the other soldiers. She remains limited and now finds it difficult to climb stairs and walk gentle inclines.

Up to this point, almost all of the soldiers diagnosed with constrictive bronchiolitis have been referred from Ft Campbell. However, we have begun to receive communications from soldiers and providers throughout the country, leading us to believe that this condition is present but not being diagnosed at other military facilities. As noted previously, this diagnosis can only be established by surgical lung biopsy and most clinicians would hesitate to recommend biopsy when x-rays and pulmonary function tests are normal.

RATING DISABILITY FOR BRONCHIOLITIS

Military and VA officials have had a difficult time rating disability in this population. In most cases, the affected soldiers are comfortable at rest and are able to perform the activities of daily living. They have normal or near normal pulmonary function tests, but at the same time they cannot meet physical training requirements and are considered unfit for deployment. This unique circumstance has challenged those who must determine a disability rating. Pulmonary function testing is the usual standard for rating respiratory disabilities, but how does one rate the soldier who is too short of breath to serve and yet has normal test results? Unfortunately, the ratings applied thus far have not been standardized. Additionally, we have seen many examples of soldiers who received one rating from the US Army only to have it downgraded by the VA.

More research is needed to understand the cause(s) and prevention of this disease. There is little doubt about the cause of bronchiolitis in those who were exposed to the Mishraq Sulfur Mine fire. There is also little doubt that those not exposed to the sulfur fires suffer from a disease caused by toxic inhalation. We must determine what these other toxins are so that preventive measures can be employed. We should also consider baseline pulmonary function testing prior to deployment knowing that our soldiers too often encounter inhalational toxins. And finally, I urge the development of standards for evaluating the condition that I have described today.

Thank you for your attention and I would be glad to answer any questions.

Chairman AKAKA. Thank you very much, Dr. Miller, for your testimony. Now we will receive the testimony of Mrs. Paganelli.

STATEMENT OF LAURIE PAGANELLI, MOTHER OF JORDAN PAGANELLI, CHILDHOOD CANCER (SARCOMA) WARRIOR AND PAST RESIDENT OF U.S. NAVAL AIR FACILITY (NAF) ATSUGI, JAPAN

Mrs. PAGANELLI. Thank you. Good morning, Chairman and Members of the Committee. Thank you for this opportunity to present my testimony on behalf of my family and as a representative for hundreds of sailors, Marines, and civilians who were unknowingly exposed to and have been adversely affected by contaminated air, soil, and water at U.S. Navy Air Facility Atsugi, Japan.

My name is Laurie Paganelli and I am a former resident of Atsugi. My husband was an active duty Navy servicemember and we were given orders to report to Atsugi in 1997. Our tour of duty was from 1997 to 2000. Our only son, Jordan, was 5 years old when we arrived. While stationed at Atsugi, he attended Shirley Lanham Elementary School, played soccer, T-ball, and attended many sporting and cultural events throughout our time there.

On January 11—excuse me—2008, our lives changed forever. Jordan, then 16 years old, was diagnosed with a rare, vicious and highly aggressive form of cancer, so aggressive in fact that by the time he displayed any symptoms, his cancer had already progressed to Stage IV.

The name of his cancer is Alveolar Rhabdo-Myo-Sarcoma, as known short, ARMS. ARMS is considered extremely rare and there are only about 350 cases each year in the United States, and because of its rarity there is a severe lack of funding for this type of cancer. Only 3 percent of research money goes toward childhood cancer research, making a 5-year survival rate dismally low.

Jordan's protocol was an intensive multi-agent therapy, including dose compressed cycles which had us calling Walter Reed Army Medical Center home for most of the 15 months of continuous treatment. Jordan also battled through 12 total weeks of daily radiation, 7 weeks to his torso and lungs, and then five more weeks to his entire head following the discovery of additional cancerous lesions that had spread to his brain.

Additionally, due to cancer-based damage to his hips, he spent 10 months on crutches and the rest with a cane. Quite the contrast to the young boy who played at Atsugi base and the high school cross country star he had been just months earlier.

During our stay at Atsugi, we were aware of the incinerator. It smelled, burned our eyes and sometimes added a greenish glow to the air around us. We certainly were not aware of the effects it would have on our family years later. As most military families do, I trusted that the Navy wouldn't let us live somewhere that was a danger to our health. I was wrong.

From 1983 to 2001, sufficient and compelling evidence showed that the blend of high toxic chemicals were released from the Shinkampo Incinerator Complex, labeled SIC, at levels that far exceeded the EPA's health risk-based guidelines. These chemicals severely contaminated the residential area of Atsugi. A partial list of chemicals include: volatile organic compounds, poly-chlorinated biphenyls, pesticides, polycyclic—excuse my pronunciations—aromatic hydro-carbons, dioxins, furans, particulates, and heavy metals.

In 1990, U.S. Department of the Navy documents referred to this plume of smoke as "witch's brew of toxic chemicals." During the operation of SIC, the Navy spent approximately $18 million dollars, performing numerous ambient air and health studies at Atsugi. The data repeatedly confirmed that Atsugi was being polluted by carcinogenic and non-carcinogenic chemicals, which are categorized by the EPA to have long latency periods, meaning that the effects would be evident years after exposure.

In 1997, the Navy began to communicate health risks to Atsugi residents. However, during the initial 12 years of incinerator operations, personnel had little to no knowledge of the potential health risks in toxic exposures. A review of the Navy's human risk assessment of Atsugi prepared in 2001 by the Committee of Toxicology stated, "there does not seem to have been a coordinated strategy for risk communication."

In 1997, risk communication efforts included instructions for residents and school children to stay indoors while the plume of

toxins blew toward the base. A standard Form 600 was added to personnel medical records stating that we were exposed to 12 toxic chemicals and exceeded the maximum contamination levels.

Although the Navy had no control over the missions of the SIC, they did have the ability to avoid exposing thousands of children to toxic chemicals. By 1990, the base residents were being exposed to dioxin and other toxic chemicals. In 1997, the Navy Inspector General reported that "the Navy must act decisively to reduce personnel exposure to incinerator contaminants. A range of options to accomplish this include, but not limited to, moving U.S. personnel to other locations, must be examined."

The 1999 study conducted by the government of Japan and the U.S. Navy found dioxin levels in the air to be dangerously high. By 2000, Defense Secretary William Cohen and chief of the Japanese Defense Agency agreed that Japan would provide temporary off-base housing and that Japan would not object to the U.S. Government's efforts to sue SIC for violating environmental laws.

In 2001, the U.S. Department of Justice brought suit against a private incinerator in a Yokohoma court. A lawsuit claimed that toxic chemicals severely polluted the air, soil and groundwater and interfered with U.S. Government rights of property and possession. The SIC was closed when the government of Japan decided to pay the incinerator owner the equivalent of $42 million to shut down and dismantle the incinerators.

The Navy had knowledge that Atsugi residents were being exposed to dioxin in the SIC emissions in the early 1990s and they knew what detrimental effects such exposure would have to the human body. As you remember, dioxin is what made Agent Orange so toxic. So, it is no surprise that by 1998, the Navy recognized their liability and instituted a one-page waiver that did not convey any information of known long-term risks associated with the SIC.

We were required to sign the waiver. In 2007, after complaints of former residents, the Navy provided a public Web site with some study-based information. However, the Web site has not been widely publicized and many former Atsugi residents do not have knowledge of its existence.

Recently the Navy started—stated that the 2009 Atsugi health study produced a registry. However, the study confirms that approximately 75 percent of the Atsugi population in the study was lost to follow-up, which adversely affects the study's end result, specifically because of the documented latency period of toxic exposure.

Over the last 3 years, an estimated 750 former residents, including retired and former active duty personnel and their families, have come together for support outside the realm of the Navy. Within this group, at least 61 cancer cases have been reported, all of which have been directly associated with dioxin exposure. They include: brain, thyroid, cervical/ovarian, colorectal, leukemia, lymphoma, and various other cases of sarcoma, many of which involve innocent children, like our son, Jordan, who lived at Atsugi while their mothers and fathers faithfully served the United States of America while stationed in Japan.

Besides cancer, many former residents suffer from illnesses, including nervous system disorders, liver and kidney damage, auto-

immune diseases, neurological disorders, cardiac irregularities, and other toxic-related diseases as defined by the Agency of Toxic Substances and Disease Registry.

In closing, I would like to state that I had the basic human right not to be exposed to the types of toxic chemicals that were highly prevalent at Atsugi. Our military members are proud to dedicate their lives in defense of this great country and we support them in their mission every day. However, we trusted the Navy to provide a safe environment for our family members, but they failed to do so, knowingly housing our families in a toxic waste zone.

We look to you, Committee Members, to rectify this gross misconduct and to take action to ensure that the VA is provided with an appropriate registry and an accurate risk of cancer and non-cancerous illnesses associated with the SIC. We urge you to ensure that all former residents are notified.

Finally, we urge you to introduce a bill to enact a new law that allows former Atsugi residents and dependents to receive appropriate VA benefits, to include medical care and disability compensation. My son has been fighting for his life and the journey so far I would not wish on any parent or family.

We will never know if this disease was caused or brought about by the exposure of the toxic chemicals at Atsugi. However, the risk imposed to him and my family and lack of proactive risk mitigation is an absolute tragedy. I pray that no other family has to endure the pain of watching their child fight for it's life.

Thank you for allowing me to speak today.

[The prepared statement of Mrs. Paganelli follows:]

PREPARED STATEMENT OF LAURIE PAGANELLI, MOTHER OF JORDAN PAGANELLI, CHILDHOOD CANCER (SARCOMA) WARRIOR AND PAST RESIDENT OF U.S. NAVAL AIR FACILITY (NAF) ATSUGI, JAPAN

Good morning Mr. Chairman and Members of the Committee: Thank you for this opportunity to present testimony on behalf of my family and as a representative for hundreds of Sailors, Marines, and civilians who were unknowingly exposed to and have been adversely affected by the contaminated air, soil, and water at U.S. Navy Air Facility Atsugi, Japan.

My name is Laurie Paganelli and I am a former resident of Atsugi. My husband is an active-duty Navy servicemember and we were given orders to report to Atsugi in 1997. Our tour of duty was from 1997–2000. Our only son, Jordan, was 5 years old when we arrived. While stationed at Atsugi, he attended Shirley Lanham Elementary School, played soccer, t-ball, and attended many other sporting/cultural events on the base throughout our time there.

On January 11, 2008 our lives changed forever. Jordan (then 16-years old) was diagnosed with a rare, vicious, and highly aggressive form of cancer—so aggressive in fact, that by the time he displayed any symptoms, his cancer had already progressed to a STAGE 4 condition. The name of his cancer is: Alveolar Rhabdo-Myo-Sarcoma ("ARMS" for short). ARMS is considered extremely rare because there are only about 350 cases diagnosed each year in the United States. And, because of its rarity, there is a severe lack of awareness and funding for this type of cancer. Only 3% of research money goes toward childhood cancer research, making the 5-year survival rate dismally low. Jordan's protocol was an Intensive Multi-Agent Therapy, including Dose-Compressed Cycles which had us calling Walter Reed Army Medical Center "home" for most of the 15 months of continuous treatment. Jordan also battled through 12 total weeks of DAILY radiation: 7 weeks to his torso and lungs; and then 5 more weeks to his entire head following the discovery of additional cancerous legions that had spread to his brain. Additionally, due to cancer-based damage to his hips, he spent 10 months on crutches and the rest with a cane—quite a contrast to the young boy who played at "Atsugi Base" and the high school cross country star he had been just months prior to diagnosis. During our stay at Atsugi we were aware of the incinerator. It smelled, burned your eyes, and sometimes added a

greenish glow to the air around us. We certainly were not aware of the effects it would have on our family years later. As most military families do, I trusted that the Navy wouldn't let us live there if it was a danger to our health. I WAS WRONG.

From 1983 until 2001, sufficient and compelling evidence showed that a blend of highly toxic chemicals were released from the Shinkampo Incineration Complex (labeled the "SIC") at levels that far exceeded the EPA's health-risk-based guidelines. These chemicals severely contaminated the residential area of Atsugi. A partial list of chemicals included: volatile organic compounds, poly-chlorinated bi-phenyls, pesticides, polycyclic aromatic hydro-carbons, dioxins, furans, particulates, and heavy metals. In 1990, U.S. Department of the Navy documents referred to this plume of smoke as a "witch's brew of toxic chemicals."

During the operation of the SIC, the Navy spent approximately 18 million dollars performing numerous ambient air and health studies at Atsugi. This data repeatedly confirmed that Atsugi was being polluted with carcinogenic and non-carcinogenic chemicals, many of which have been categorized by the EPA to have long-latency periods—meaning that their affects would be evident years after the exposure.

In 1997, the Navy began to communicate health risks to Atsugi residents. However, during the initial 12 years of incinerator operations, personnel had little or no knowledge of the potential health risks of their toxic exposure. In fact, a review of the Navy's Human Health Risk Assessment of Atsugi (prepared in 2001 by the Committee of Toxicology) stated: "There does not seem to have been a coordinated strategy for risk communication."

In 1997, risk communication efforts included instructions for residents and school children to stay indoors when the plume of toxins blew toward the base. A "Standard Form 600" was added to personnel medical records stating that we were exposed to 12 toxic chemicals that exceeded Maximum Contamination Levels.

Although the NAVY had no control over the emissions of the SIC, they did have the ability to avoid exposing thousands of children to toxic chemicals. By early 1990, it was evident that base residents were being exposed to Dioxin and other toxic chemicals. In 1997, the Navy Inspector General reported that "The Navy must act decisively to reduce personnel exposure to incinerator contaminants. A range of options for accomplishing this, including (but not limited to) moving U.S. personnel to other locations, must be examined."

The 1999 study conducted by the Government of Japan and the U.S. Navy, found dioxin levels in the air to be dangerously high. By 2000, Defense Secretary William Cohen and the Chief of the Japanese Defense Agency agreed that Japan would provide temporary off-base housing and that Japan would not object to the U.S. government's efforts to sue the SIC for violating environmental laws.

In 2001, the United States Department of Justice brought suit against the private incinerator in a Yokohoma Court. The lawsuit claimed that toxic chemicals severely polluted the air, soil, and ground water and interfered with the U.S. Government rights of property use and possession. The SIC was closed when the Government of Japan decided to pay the incinerator owner the equivalent of 42 million dollars to shut down and dismantle the incinerators.

The NAVY had knowledge that Atsugi residents were being exposed to Dioxin in the SIC's emissions by the early 1990's; and they knew what detrimental affects such exposure would do to the human body. As you remember, Dioxin is what made "Agent Orange" so toxic. So, it's no surprise that by 1998, the NAVY recognized their liability and instituted a one page waiver that did not convey information of the known long-term risk associated with the SIC. We were all REQUIRED to sign this waiver.

In 2007, after complaints of former residents, the NAVY provided a public Web site with some study-based information. However, the Web site has not been widely publicized and many former Atsugi residents still do not have knowledge of its existence.

Recently, the NAVY has stated that the 2009 Atsugi Health Study produced a registry. However, the study confirms that approximately 75% of the Atsugi population in the study was lost to follow-up, which adversely affected the study's end result—specifically because of the documented latency period of the toxic exposure.

Over the last three years, an estimated 750 former residents (including retired and former active duty personnel and their families) have come together for support outside the realm of the NAVY. Within just this group, at least 61 cancer cases have been reported—all of which have been directly associated with Dioxin exposure. They include Brain, Thyroid, Cervical/Ovarian, Colo-Rectal, Leukemia, Lymphoma and various other cases of sarcoma—many of which involve innocent children (like our son Jordan) who lived at Atsugi while their mothers and fathers faithfully served the United States of America while stationed in Japan.

Besides cancer, many former residents suffer from illnesses including; nervous system disorders, liver and kidney damage, auto-immune diseases, neurological disorders, cardiac irregularities, and other toxic related diseases as defined by the Agency for Toxic Substances and Disease Registry.

In closing, I would like to state that we had the basic human right not to be exposed to the types of toxic chemicals that were highly prevalent at Atsugi. Our military family members are proud to dedicate their lives in defense of our great county; and, we support them and their mission each and every day. However, we trusted the Navy to provide a safe environment for our family members. But, they failed to do so by knowingly housing our families in a toxic waste zone.

We look to you, committee members, to rectify this gross misconduct and to take action to ensure that the VA is provided with an appropriate registry and an accurate list of cancer and non-cancerous illnesses associated with the SIC exposure. We urge you to ensure that all former residents are notified. Finally, we urge you to introduce a bill to enact a new law that allows former Atsugi residents and dependents to receive the appropriate VA benefits to include medical care and disability compensation.

My son has been fighting for his life; and his journey thus far is one that NO parent should ever have to take with their child. We will never know if his disease was caused (or brought about) by the exposure of toxic chemicals at Atsugi. However, the risk imposed to him and my family, and the lack of proactive risk mitigation, is an absolute tragedy. I pray that no other family has to endure the pain of watching their child fight for their lives.

Thank you for allowing me to speak to you today.

Chairman AKAKA. Thank you very much, Mrs. Paganelli. Now we will receive the testimony of Dr. Feigley.

STATEMENT OF CHARLES E. FEIGLEY, Ph.D., PROFESSOR, ENVIRONMENTAL HEALTH SCIENCES, PUBLIC HEALTH RESEARCH CENTER, ARNOLD SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF SOUTH CAROLINA; CHAIR, SUBCOMMITTEE ON THE ATSUGI INCINERATOR COMMITTEE ON TOXICOLOGY BOARD ON ENVIRONMENTAL STUDIES AND TOXICOLOGY DIVISION ON EARTH AND LIFE STUDIES, NATIONAL RESEARCH COUNCIL, THE NATIONAL ACADEMIES

Mr. FEIGLEY. Good morning, Mr. Chairman and Members of the Committee. Thank you for your concern about the health of veterans.

My names is Charles Feigley. I am professor of environmental health sciences at the University of South Carolina, Arnold School of Public Health. I am also principal investigator of a DOD-sponsored contract testing the use of copper in air conditioning systems to improve air quality and reduce illness in the military.

As well, I am principal investigator of the University of South Carolina Center for Public Health Preparedness, which is funded by the Centers for Disease Control and Prevention. We assist State, local, and tribal health agencies and their community partners to prepare for a wide range of public health emergencies.

In addition, I have served on a number of committees of the National Research Council, or NRC, including as chair of the NRC subcommittee that prepared the report titled, "Review of the U.S. Navy's Health Risk Assessment of the Naval Air Facility at Atsugi."

The National Research Council is an operating arm of the National Academy of Sciences, not part of the government, and it is—it was established in 1863 by Congress and under President Lincoln to advise the government on matters of science and tech-

nology. I am here before you today because of my experience as a volunteer serving on that NRC committee.

The NRC report titled, Review of the U.S. Navy's Health Risk Assessment of the Naval Air Facility at Atsugi was prepared in response to requests from the U.S. Navy for an independent review of the final draft of the Navy Environmental Health Center's report on the risk assessment at Atsugi which was in 2000, the year 2000.

The NEHC, that is, the Naval Environmental Health Center, that prepared the risk assessment report that we reviewed, had conducted a risk assessment because of concerns that were raised by residents of Atsugi, the U.S. Navy personnel, and their families regarding health effects of what came to be called Enviro-Tech Incinerator—the Enviro-Tech Incinerator, formally called Shinkampo or Jinkanpo Incinerator Complex.

That complex was adjacent to the U.S. Naval Air Facility which is located southwest of Tokyo, and when I say adjacent, one of the critical things that really is not mentioned in my written statement is that the incinerator is at a much lower elevation than the base facility. The stacks from the incinerator discharged just above the level of the naval air facility so that when the air is—when the bin is blowing, as it frequently is, from the incinerator to the base, they were directly downwind and at really pretty much the same level of discharge.

The concerns were related to the exposure to emissions from the incinerator and to chemicals resulting from the storage handling and disposal of waste material at the facility. The risk assessment was conducted after a previous NRC committee recommended that a comprehensive health study at NAF at Atsugi be conducted.

The NRC subcommittee on Atsugi consisted of members selected for their expertise in toxicology, epidemiology, industrial hygiene, engineering, exposure assessment, and risk assessment. We were specifically asked to do two things. This is our charge: review the adequacy of the methods used to assess risks, the uncertainty is identified, the risk to susceptible subpopulations, such as pregnant women and young children, and the scientific validity of the conclusions drawn.

Second, to recommend research to fill data gaps and options for mitigating risks associated with exposure to the incinerator emissions. It is important to note that you can see from these specific tasks that the subcommittee was not asked to determine the potential health effects from the incinerator, but to review the assessment that was conducted by the Naval Environmental Health Center.

In its review, the subcommittee identified a number of aspects of the risk assessment that were exemplary and others that needed improvement. The subcommittee noted that the NEHC risk assessment included a rigorous quality assurance and quality control program and the subcommittee, therefore, had confidence in the accuracy of the data collected.

The subcommittee was pleased with a broad number of air pollutants that were monitored and the collection of meteorological data. It also commended the NEHC for calculating risks of acute and chronic toxicity endpoints of the different subpopulations.

The subcommittee was concerned however about inconsistencies in the objectives of the risk assessment, some technical aspects regarding how the collected data was used in the risk assessment, and the interpretation of data and risk assessment findings by the NEH. The subcommittee also commented on the lack of analysis and characterization of uncertainty in the risk assessment.

The subcommittee concluded that the NEH had collected a large amount of sampling data at NAF Atsugi. If analyzed and interpreted appropriately, the data might have been adequate to determine whether the air pollution at NAF Atsugi poses a health risk and how much the incinerator facility contributes to that pollution.

However, the analyses of the data were inadequate to draw conclusions about the health risks of the persons residing at NAF Atsugi and about the contributions of the incinerator to those risks. In addition, the NEHC had interpreted some of the results of the risk assessment without taking into account the meaning and limitations of the risk assessment process.

The subcommittee concluded that aspects of the analyses and interpretation of the data, not the underlying data themselves, constituted the main limitation of the risk assessment. The committee provided recommendations to improve the NEH risk assessment, including recommendations for the planning of the risk assess—of risk assessments, determination of attributable risk, analysis of air monitoring data, interpretation of risk assessment, treatment of uncertainty and information gaps that should be filled, and improvements in the presentation and organization of the NEH draft summary report itself.

Given the aforementioned limitations of the Navy's risk assessment draft summary report, the subcommittee found that the analyses presented did not determine reliably whether military personnel and their families incurred health risks by living at NAF Atsugi, nor did the analyses represent reliably the contribution of the incinerator to those health risks.

With that, I once again thank you for inviting me to testify before this Committee. I appreciate the important work that the Committee does for veterans' affairs and welcome any questions you might have.

[The prepared statement of Mr. Feigley follows:]

PREPARED STATEMENT OF CHARLES E. FEIGLEY, PH.D. PROFESSOR, ENVIRONMENTAL HEALTH SCIENCES, PUBLIC HEALTH RESEARCH CENTER, ARNOLD SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF SOUTH CAROLINA

Good morning Mr. Chairman and Members of the Committee. Thanks to Senator Akaka and Members of the Committee on Veterans' Affairs for your concern about veteran's health.

My name is Charles Gene Feigley. I am a professor of environmental health sciences at the University of South Carolina, Arnold School of Public Health.. I am Principal Investigator of a DOD-sponsored project testing the use of copper in air conditioning systems to improve air quality and reduce illness in the military. I am also Principal Investigator of the University of South Carolina's Center for Public Health Preparedness funded by the Centers for Disease Control and Prevention to assist State, local, and tribal health agencies and their community partners prepare for response to a wide range of public health emergencies. In addition, I have served on a number of committees of the National Research Council (NRC), including as Chair of the NRC Subcommittee that prepared the report *Review of the U.S. Navy's Health Risk Assessment of the Naval Air Facility at Atsugi*. The National Research Council is the operating arm of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine of the National Academies, char-

tered by Congress in 1863 to advise the government on matters of science and technology. I am here before you today because of my experience as a volunteer serving on that NRC Committee.

The NRC report, *Review of the U.S. Navy's Health Risk Assessment of the Naval Air Facility at Atsugi*, was prepared in response to a request from the US Navy for an independent review of the Navy Environmental Health Center (NEHC) report *NAF Atsugi, Japan Human Health Risk Assessment Summary of Findings, Conclusions and Recommendations, Draft Final, January 2000*, as well as a number of supporting documents for that risk assessment. The NEHC had conducted that risk assessment because of concerns that had been raised by the residents of NAF Atsugi—US Navy personnel and their families—regarding the health effects of the Enviro-Tech incinerator facility (formerly called the Shinkampo or Jinkanpo incinerator complex). That complex was adjacent to the US Naval Air Facility (NAF) at Atsugi, Japan, southwest of Tokyo. Enviro-Tech was a privately owned waste-combustion facility that consists of three incinerators, a waste-staging area, and an ash-holding area. The concerns were related to exposure to emissions from the incinerators and to chemicals resulting from the storage, handling, and disposal of waste material at the facility. The risk assessment was conducted after a previous NRC subcommittee had recommended that a comprehensive health risk assessment of NAF Atsugi be conducted.

The NRC Subcommittee on the Atsugi Incinerator—which consisted of members selected for their expertise in toxicology, epidemiology, industrial hygiene, engineering, exposure assessment, and risk assessment—was specifically asked to:

1. Review the adequacy of the methods used to assess risk, the uncertainties identified, the risks to susceptible subpopulations (such as pregnant women and young children), and the scientific validity of the conclusions drawn.
2. Recommend, depending on its evaluation, research to fill data gaps and options for mitigating the risks associated with exposure to the incinerator emissions.

It is important to note that, as you can see from those specific tasks, the Subcommittee was not asked to determine the potential health effects from the incinerator, but to review the assessment that was conducted by the NEHC. In its review the Subcommittee identified a number of aspects of the risk assessment that were exemplary and others that needed improvement.

The Subcommittee noted that the NEHC risk assessment included a rigorous quality-assurance and quality-control program, and the Subcommittee therefore had confidence in the accuracy of data collected. The Subcommittee was pleased with the broad number of air pollutants that NEHC monitored and the collection of meteorological data. It also commended the NEHC for calculating the risks of acute- and chronic-toxicity end points for different subpopulations.

The Subcommittee was concerned, however, about inconsistencies in the objectives of the risk assessment, some technical aspects regarding how the collected data was used in the risk assessment, and the interpretation of the data and risk assessment findings by the NEHC. The Subcommittee also commented on the lack of uncertainty analysis or characterization in the risk assessment.

The Subcommittee concluded that NEHC had collected a large amount of sampling data at NAF Atsugi. If analyzed and interpreted appropriately, those data might have been adequate to determine whether air pollution at NAF Atsugi poses a health risk and how much the incinerator facility contributes to that pollution. However, the analyses of the data were inadequate to draw conclusions about the health risks for persons residing at NAF Atsugi and about the contribution of the incinerator to those risks. In addition, NEHC had interpreted some of the results of the risk assessment without taking into account the meaning and limitations of the risk-assessment process. The Subcommittee concluded that aspects of the analyses and interpretation of the data, not the underlying data themselves, constituted the main limitation of the risk assessment. The Subcommittee provided recommendations to improve the NEHC risk assessment, including recommendations for the planning of risk assessments, determination of attributable risk, analysis of air-monitoring data, interpretation of the risk assessment, treatment of uncertainty, information gaps that should be filled, and improvements in the presentation and organization of the NEHC draft summary report itself. Given the aforementioned limitations of the Navy's risk assessment draft summary report, the Subcommittee found that the analyses presented did not determine reliably whether military personnel and their families incur increased health risks by living at NAF Atsugi. Nor did the analyses presented reliably determine the contribution of the incinerator facility to health risks.

With that, I would once again like to thank you for inviting me to testify before this Committee. I appreciate the important work conducted by the Committee on Veterans' Affairs and welcome any questions you may have.

POST-HEARING QUESTIONS SUBMITTED BY HON. DANIEL K. AKAKA TO CHARLES E. FEIGLEY, PH.D., PROFESSOR, UNIVERSITY OF SOUTH CAROLINA, CHAIR, SUBCOMMITTEE ON THE ATSUGI INCINERATOR

Question 1. Please provide the Committee with the best estimate of the size of population that was at Atsugi between 1983 and 2001. Of this population, how many were servicemembers and how many were dependents, both adult and children? Please also provide the ages of the children.

Question 2. Is there a study that can be done that will provide more accurate data than those done in the past? What would that look like?

[The Committee had not received the requested information by press time.]

Chairman AKAKA. Thank you, Dr. Feigley. Dr. Gibb, your testimony, please.

STATEMENT OF HERMAN GIBB, Ph.D., M.P.H.

Mr. GIBB. Good morning. Thank you for the opportunity to testify this morning. I will be testifying on the subject of Qarmat Ali. I am testifying in my personal capacity and do not in any way represent the interest, beliefs or opinions of my employer.

I presented similar testimony to the Senate Democratic Policy Committee hearing on August 3, 2009. The subject of that hearing was, "The Exposure at Qarmat Ali—Did the Army Fail to Protect U.S. Soldiers Serving in Iraq?" I have a Ph.D. in epidemiology from the Johns Hopkins University and an MPH in environmental health from the University of Pittsburgh.

I spent 29 years at the U.S. Environmental Protection Agency. Most of my time at the EPA was spent at the National Center for Environmental Assessment where I served in the capacities of assistant center director and associate director for health. Based on my experience working at EPA on risk assessments of hexavalent chromium and my study of chromate production workers, I can state that the symptoms reported by the soldiers who served at Qarmat Ali are consistent with significant exposure to sodium dichromate.

Sodium dichromate—and I may use the term hexavalent chromium and sodium dichromate interchangeably—but sodium dichromate is a hexavalent chromium compound. EPA maintains an online database of risk assessments on over 500 substances, including an evaluation of the potential of these substances to cause cancer in humans. Hexavalent chromium is classified as a human carcinogen.

Among those substances that the EPA has classified as carcinogenic to humans, and it is estimated a cancer inhalation unit risk, the highest risk is that for hexavalent chromium. In other words, it is the most carcinogenic.

In 2000, while at the EPA, I was the senior author of two publications on the health risks experienced by chromate production workers at a facility in Baltimore, MD. The first publication reported the results of a mortality study. The second examined the risk of clinical irritation experienced by the workers.

The hexavalent chromium exposure at the facility was primarily from sodium dichromate, which is the same exposure that the soldiers experienced at Qarmat Ali. From my work on these studies, the EPA awarded me the Agency Scientific and Technological Achievement Award. I became interested in studying the group of workers in Baltimore because of the considerable amount of exposure data available for the facility. The group was relatively large, 2,357 workers. There were 122 deaths from lung cancer.

Hexavalent chromium was found to be significantly associated with an increased risk of lung cancer even after controlling for smoking. Half of those who developed lung cancer had worked at the facility for less than 10 months. And I might add that one quarter of the lung cancer cases had worked at the facility for 2 months or less.

In 2006, based in large measure on our study, the Occupational Safety and Health Administration set a permissible exposure limit for hexavalent chromium of 5 micrograms per cubic meter for—as an 8-hour time weighted average. This new OSHA PEL reduced the previous PEL by over 10-fold.

Clinically diagnosed symptoms of irritation were found to occur in our study population within a relatively short time period after beginning employment. The medium time to develop an irritated nasal septum was only 20 days. That means that half of the workers developed it in less than 20 days and half developed it in more than 20 days: an ulcerated nasal septum, 22 days; a bleeding nasal septum, 92 days; a perforated nasal septum 182 days.

We recorded 10 different types of clinically diagnosed irritation. What was also remarkable was the higher percentage of the group that was diagnosed with signs of irritation. For example, 68 percent of the group was diagnosed at one time or another with nasal irritation. The signs of irritation which the soldiers and workers experienced at Qarmat Ali are consistent with what we reported in our study.

The testimony by Russell Powell in the hearing today, by the soldiers in the hearing held by the Democratic Policy Committee on August 3, and by the civilian workforce in the previous hearing held on this subject suggests that they are experiencing signs of hexavalent chromium exposure.

A report from the Army Center for Health Promotion and Preventive Medicine, CHPPM, indicated the blood samples were collected from 137 potentially exposed soldiers and DOD civilians. CHPPM's description of these results is confusing and lacks sufficient detail. CHPPM suggests that the chromium and the red blood cells of the vast majority of the individuals in their study are within normal ranges. However, CHPPM notes in italicized print that there are some other literature references that have lower limits.

Unfortunately, CHPPM does not specify the literature sources, nor do they indicate how low these lower limits are. Where did CHPPM get their reference values and how good are they? Although CHPPM reports that nearly all of the test results were below the limit of detection, CHPPM also reports that 98 percent of the samples showed chromium levels within the range of four to five micrograms per liter. How is it possible that 98 percent of the samples could be within the range of four to five micrograms per

liter when they report that nearly all of the results were below the limit of detection?

In 1987, an article cited by the National Institute for Occupational Safety and Health, Dr. Angerer and others found that exposures 10 times the current OSHA limit will result in a concentration of chromium in red blood cells of .6 micrograms per liter. Assuming Angerer and his coauthors are correct, and accounting for at least the 40-day delay in CHPPM's collection of blood samples, the air concentration which the Qarmat Ali soldiers were exposed could be estimated to be approximately 80 to 200 times the current OSHA limit.

Why did CHPPM fail to explore inconsistencies in its data with that of other literature? These limitations call for greater scrutiny of the CHPPM results. The samples drawn from some of the soldiers and workers at Qarmat Ali were reported by CHPPM to have been taken approximately a month after remediation measures were taken to limit the exposure.

At the Democratic Policy Committee meeting on August 3, there were four soldiers attending. Only one of them had had their blood drawn and I asked when it was drawn and he said it was 60 days after exposures ended. In its draft, Toxicological Profile on Chromium, the Agency for Toxic Substances and Disease Registry reports that the half life of chromium in red blood cells is 30 days. In other words, 30 days after the exposure has ended, we expect to see only 50 percent of the chromium in the volume of red blood cells that would have been there initially.

The measurements of chromium in red blood cells is an insensitive method of detecting hexavalent chromium exposure. The measurement of chromium in the red blood cell only captures the hexavalent chromium that makes its way into the cell. It does not measure how much hexavalent chromium may have been inhaled and remains in the nose or lung or was reduced in the body to trivalent chromium, which is not getting to the red blood cell; nor does it measure the chromium that was eliminated from the body.

It should be noted that NIOSH in its draft update on hexavalent chromium states the biomarkers, which would include blood tests, are of uncertain value as early indicators of potential hexavalent chromium-related health effects. ATSDR reports that 90 percent of absorbed chromium is eliminated within 24 hours. Nevertheless, CHPPM still put a great deal of emphasis on the red blood cell analyses from samples taken at least 4 weeks and maybe 2 months after possible exposure to hexavalent chromium.

An analogy would be like giving a breathalyzer to a person 3 days after they were pulled over for erratic driving. The toxin would have been eliminated from the body in the intervening period. Given the limited usefulness of these red blood cell tests, they should not be used as a bottom-line indicator of the hexavalent chromium exposure that the soldiers and workers experienced and they certainly should not be extrapolated to other individuals who were exposed at Qarmat Ali.

Nasal perforations, bloody noses and skin irritation would be far more telling about the soldiers and workers' exposures that measures the chromium and red blood cells taken 1 month or maybe 2 months after remediation has taken place.

In summary, the symptoms that have been reported by the soldiers and civilian workers are consistent with what has been experienced by other workers exposed to hexavalent chromium. Judgment on whether these soldiers and civilian employees were exposed should not be based on measurements of red blood cells taken 1–2 months after remediation measures were taken, nor should such results be extrapolated to other individuals who were present at the facility.

Again, I thank you, Mr. Chairman, for the opportunity to testify today.

[The prepared statement of Mr. Gibb follows:]

PREPARED STATEMENT OF HERMAN GIBB, PH.D., M.P.H.

Good afternoon. I am Dr. Herman Gibb. Thank you for the opportunity to testify before you today. I am testifying in my personal capacity and do not in any way represent the interests, beliefs or opinions of my employer. I presented similar testimony to the Senate Democratic Policy Committee hearing on August 3, 2009. The subject of that hearing was "The Exposure at Qarmat Ali: Did the Army Fail to Protect U.S. Soldiers Serving in Iraq?"

I have a Ph.D. in Epidemiology from the Johns Hopkins University and an M.P.H. in Environmental Health from the University of Pittsburgh. I spent 29 years at the U.S. Environmental Protection Agency (EPA). Most of my time at the EPA was spent at the National Center for Environmental Assessment where I served in the capacities of Assistant Center Director and Associate Director for Health. Based on my experience working at the EPA on risk assessments of hexavalent chromium and my study of chromate production workers, the symptoms reported by some of the soldiers who served at Qarmat Ali are consistent with significant exposure to sodium dichromate.

EPA maintains an online database of risk assessments on over 500 substances, including an evaluation of the potential of these substances to cause cancer in humans. Hexavalent chromium is classified as a human carcinogen. Among those substances that the EPA has classified as carcinogenic to humans and has estimated a cancer inhalation unit risk, the highest risk is that for hexavalent chromium. In 2000, while at the EPA, I was the senior author of two publications on the health risks experienced by chromate production workers at a facility in Baltimore, MD. The first publication reported the results of a mortality study, the second examined the risk of clinical irritation experienced by the workers. The hexavalent chromium exposure at the facility was primarily from sodium dichromate. For my work on these studies, the EPA awarded me the Agency's Scientific and Technological Achievement Award.

I became interested in studying the group of workers in Baltimore because of the considerable amount of exposure data available for the facility. The group was relatively large—2,357 males; there were 122 deaths from lung cancer. Hexavalent chromium was found to be significantly associated with an increased risk of lung cancer, even after controlling for smoking. Half of those who developed lung cancer had worked at the facility for less than ten months.

In 2006, based in large measure on our study, the Occupational Safety and Health Administration (OSHA) set a Permissible Exposure Limit (PEL) for hexavalent chromium of 5 micrograms per cubic meter (μg/m3) as an 8-hour time-weighted average based on the carcinogenic dose response. The new OSHA PEL reduced the previous PEL by over 10-fold.

Clinically diagnosed symptoms of irritation were found to occur in our study within a relatively short time period after beginning employment. The median time to develop an irritated nasal septum was only 20 days, an ulcerated nasal septum 22 days, a bleeding nasal septum 92 days, a perforated nasal septum 182 days. We recorded 10 different types of clinically diagnosed irritation. What was also remarkable was the high percentage of the group that was diagnosed with signs of irritation. For example, sixty-eight percent of the group was diagnosed at one time or another with nasal irritation.

The signs of irritation which the soldiers and workers experienced at Qarmat Ali are consistent with what we reported in our study. The testimony by Russell Powell in the hearing today, by the soldiers in the hearing held by the Democratic Policy Committee on August 3, and by the civilian workers in the previous hearing held

on this subject suggest that they are experiencing signs of hexavalent chromium exposure.

A report from the Army's Center for Health Promotion and Preventive Medicine (CHPPM) indicated that blood samples were collected from 137 potentially exposed soldiers and DOD civilians. CHPPM's description of these results is confusing and lacks sufficient detail.

• CHPPM suggests that the chromium in the red blood cells of the vast majority of the individuals in their study are within normal ranges. However, CHPPM notes, in italicized print, that "there are some other literature references that use lower limits." Unfortunately, CHPPM does not specify the literature sources nor do they indicate how low these "lower limits" are. Where did CHPPM get their reference values and how good are they?

• Although CHPPM reports that nearly all of the test results were below the limit of detection, CHPPM also reports that ninety-eight percent of the samples showed chromium levels within the range of 4 to 5 micrograms per liter (μg/L). How is it possible that ninety-eight percent of the samples could be within the range of 4 to 5 micrograms per liter when they report that nearly all the results were below the limit of detection?

• In a 1987 article cited by the National Institute for Occupational Safety and Health (NIOSH), Dr. Angerer and others found that exposures 10X the current OSHA limit will result in a concentration of chromium in red blood cells of 0.6 micrograms per liter (μg/L). Assuming Angerer and his co-authors are correct and accounting for at least a 40-day delay in CHHPM's collection of blood samples, the air concentration to which the Qarmat Ali soldiers were exposed could be estimated to be approximately 80–200 times the current OSHA limit. Why did CHPPM fail to explore inconsistencies in its data with that of other literature?

These limitations call for greater scrutiny of the CHPPM results. The samples drawn from some of the soldiers and workers at Qarmat Ali were taken a month after remediation measures were taken to limit the exposure. In its draft Toxicological Profile on Chromium, the Agency for Toxic Substances and Disease Registry (ATSDR) reports that the half-life of chromium in red blood cells is 30 days. In other words, 30 days after the exposure has ended, we would expect to see only 50 percent of the chromium in the volume of red blood cells that would have been there initially.

Furthermore, the measurement of chromium in red blood cells is an insensitive method of detecting hexavalent chromium exposure. The measurement of chromium in the red blood cell only captures the hexavalent chromium that makes its way into the cell. It does not measure how much hexavalent chromium may have been inhaled and remained in the nose or lung or was reduced in the body to trivalent chromium which does not get into the red blood cell.

It should be noted that NIOSH, in its draft update on hexavalent chromium states that biomarkers, which would include blood tests, are of uncertain value as early indicators of potential hexavalent chromium-related health effects. Nevertheless, CHPPM still put a great deal of emphasis on the red blood cell analyses from samples taken at least four weeks after possible exposure to hexavalent chromium. An analogy would be like giving a breathalyzer to a person three days after they were pulled over for erratic driving. The toxin would have been eliminated from the body in the intervening period.

Given the limited usefulness of these red blood cell tests, they should not be used as a bottom line indicator of the hexavalent chromium exposure that the soldiers and workers experienced. And they certainly should not be extrapolated to other individuals who were exposed at Qarmat Ali. Nasal perforations, bloody noses, and skin irritation would be far more telling about the soldiers' and workers' exposure than measures of chromium in red blood cells taken a month after remediation has taken place.

In summary, the symptoms that have been reported by the soldiers and civilian workers are consistent with what has been experienced by other workers exposed to hexavalent chromium. Judgment on whether these soldiers and civilian employees were exposed should not be based on measurements of chromium in red blood cells taken 30 days after remediation measures were taken, nor should such results be extrapolated to other individuals who were present at the facility.

POST-HEARING QUESTIONS SUBMITTED BY HON. DANIEL K. AKAKA TO HERMAN GIBB, PH.D., MPH

Question 1. In the Baltimore study, workers exhibited symptoms between 20 and 182 days. One-fourth of the workers who had cancer had worked at the facility for

less than two months. The Army has stated that even soldiers, such as Russell Powell, who were at Qarmat Ali for extended periods of time, were not exposed for a long enough amount to produce any adverse or long term health effects. Given the exposure period of those in the Baltimore study and the symptoms and conditions those individuals exhibited in that amount of time, do you agree with the Army's assertion?

Question 2. Do you believe, given Russell Powell's length of time at Qarmat Ali, that his symptoms can be attributed to his exposure?

Question 3. Given the similarities between the illnesses and the symptoms exhibited by both the Baltimore workers and the Qarmat Ali soldiers, and considering that both groups had a similar period of exposure, is it reasonable that the same unique symptoms experienced by so many Qarmat Ali soldiers could be attributed to other factors? What, if any, environmental or otherwise, factors could be responsible for such conditions, experienced by a number of servicemembers within the same vicinity?

Question 4. In Mr. Resta's testimony, he stated that blood tests alone were not the predominant indicators for exposure. Mr. Resta stated that the Army primarily relied on physical exams when making the final determination on exposure. Do you believe that a physical exam would provide a more accurate indication if an individual was exposed to sodium dichromate? What method of detection do you believe to be the most accurate?

Question 5. In your research on sodium dichromate, have you ever observed a latency period between the time an individual was exposed to the chemical and the time it took symptoms or conditions to manifest themselves?

[The Committee had not received the requested information by press time.]

Chairman AKAKA. Thank you very much, Dr. Gibb. Now we will receive the testimony of Mr. Powell.

STATEMENT OF RUSSELL POWELL, FORMER U.S. ARMY STAFF SERGEANT

Mr. POWELL. Thank you, Mr. Chairman. I thank the Committee Members for having me testify here today and also a special thanks to the Veterans of Foreign Wars.

My name is Russell Powell. I live in Moundsville, West Virginia. I started my military career in 1994, in the 1–505 Parachute Infantry Regiment as a medic. Later through my military career, I became a flight medic in Panama and Fort Bragg.

In 2001, I joined the West Virginia Army National Guard as a medic. In April 2003—or excuse me—March 2003, the 1092nd Engineer Battalion was deployed to Iraq. From April 2003 to June 2004, the 1092nd was assigned as security for KBR workers. When Charlie Company arrived at the plant, which was the Qarmat Ali Water Treatment Plant, it had been seriously pillaged and destroyed.

There was a coating of orange-colored dust throughout the facility and at the time, no one knew or made any concerns of what the powder was. The orange dust was located in large bags that were ripped open throughout the facility. During my stay at Qarmat Ali, there were at least 10 dust storms. They would blow through the facility picking up dust and debris.

At no time were myself or other soldiers or KBR workers offered any protective clothing, masks or respirators to keep us from the elements. During these storms or shortly after about 90 percent of the KBR workers and the soldiers would have severe nose bleeds, cough up blood, have a hard time breathing and experience nausea and burning sensations to their lungs and throat.

After a week of being at the facility, several personnel began getting skin lesions on their hands, arms, faces and nostrils. Of course, we also had soldiers that developed deviated—or excuse me—perforated septums, which cause holes through their nose from one end of their nose to the other.

As a medic, I felt pretty concerned for the safety and health of all the persons that were sitting at the Qarmat Ali Treatment Plant. I talked to one of the KBR workers and I asked him what is going on about everybody getting real sick, getting bloody noses. And one of the KBR workers said their supervisor said we are all allergic to the dust and sand.

Later on, there was another dust storm and I was eating an MRE. The storm hit me when I started eating. My lungs started burning. My throat started burning and I started being real nauseated and sick. The same day they said Doc, you are not going out to the water treatment plant tomorrow; you just stay in and go to the infirmary and see one of the Navy doctors.

Well I went to one of the Navy doctors at Camp Commando in Kuwait and he pretty much said oh, you are sick. You just got a viral infection. But I went to a bomb shell bunker and tried to give myself an I.V. because I knew I was—there was something really wrong. After I went to that bomb shell shelter and tried to administer an I.V., I do not really remember anything.

I woke up in the hospital, The Kuwaiti Soldiers Hospital. There was a couple of Navy soldiers that found me and they said, I was just coughing up blood and delirious. Well, I spent a week at the Soldiers Hospital. My face and lips were burnt, yet I was not out—exposed to any sun. It was pretty much from the dust.

I got out of the hospital, but—excuse me—at the hospital, the doctor said that they did not really know what caused my face and lips to be burnt as bad as they were. They went ahead and just gave me a bunch of antibiotics, sent me back to Qarmat Ali.

When I got back to Qarmat Ali, there were a bunch of soldiers, a bunch of my soldiers complaining of the same symptoms that I had when I went to the Kuwaiti hospital. Of course, I gave them antibiotics because we did not have physician. We did not have a physician assistant, so I pretty much became the doctor for the battalion.

In June 2003, Indiana National Guard soldiers relieved us from our duties from Qarmat Ali. At no time did any of the 1092nd from the West Virginia National Guard get tested for any exposure to chemicals, blood drawn or anything; or even told about it. When I left Iraq in April 2004, I went to the VA Clinic in Clarksburg, West Virginia, and talked to them about my skin rashes, stomach problems, and nose bleeds. The doctors were unable to determine what was the cause of these problems.

In 2009, I received a letter from the West Virginia National Guard stating that we were possibly exposed to sodium dichromate while serving at Qarmat Ali. The VA doctors believed this could be the cause of our health issues, but because they know little about sodium dichromate, they are still researching, trying to figure out the effects of it on the human body.

I would like to thank Senator Rockefeller and his staff, and especially the VFW, for giving soldiers and veterans much needed sup-

port through the VA system in West Virginia. Once again, I thank all of you for having me here today.

[The prepared statement of Mr. Powell follows:]

PREPARED STATEMENT OF RUSSELL POWELL, FORMER U.S. ARMY STAFF SERGEANT

I'd like to thank you for having me here at this Senate hearing. My name is Russell Powell, I reside in Moundsville, West Virginia. I started my military career in January 1994; I was assigned to the 82nd Airborne Division as a paratrooper infantry medic. In 1997 I was reassigned as a flight medic at Howard Air Force Base Panama City, Panama. In 1999 I was again reassigned to 57th Dust off at Fort Bragg, North Carolina. August 2000, I was discharged from the army and in April 2001 I joined with 1092nd West Virginia Army National Guard as a medic. The 1092nd was deployed to Iraq in March 2003. In April 2003 to June 2004 1092nd Charlie Company was assigned as security for the KBR Contractors, my duties consisted of battalion medic and supplied defensive positions and cover fire if needed to protect KBR contractors at Qarmat Ali Water treatment plant in Basra, Iraq.

When Charlie Company 2nd platoon arrived at the plant it was in total disarray and had been severely pillaged and destroyed. There was a coating of orange colored dust throughout the facility. At that time no one knew or made any concerns of what the powder was. The orange dust was located in large bags that were ripped open, causing the dust to be spread all over the facility. At times the orange dust was so thick there were at least two inches of dust on my boots. During my stay at the QA there were at least ten dust storms, they were like tornadoes blowing through the facility picking up the dust and other debris. At no time were we offered any kind of protective clothing, masks, or respirators to protect us from the elements. During these storms or shortly there after soldiers in the company, KBR workers and myself would have severe nose bleeds, coughing up blood, a hard time breathing, nausea, and/ or a burning sensation the lungs and throat. After a few weeks of being at the facility several personnel began getting lesions on their hands, arms, faces and nostril area. As a medic I felt very concerned for the safety and health of persons exposed. I questioned one of the KBR workers (I have forgotten his name), and he told me that his supervisors told him not to worry about it, that we were allergic to sand and dust. Shortly there after, there was another severe dust storm I ate an MRE (meals ready to eat) and my throat and stomach began to burn like nothing I have felt before, my nose began to bleed, and was nauseated. After this particular storm I was severely sick to the point that when we returned to Kuwait City, Kuwait (Camp Commando) I was told that I was not going out on the mission the following day.

The following day I went to the Infirmary at Camp Commando, and was seen by a Naval Doctor. After a brief examination he dismissed me as being sick and prescribed me Motrin and Tylenol. Approximately thirty minutes later I went to a bombshell bunker to give myself an IV, a couple soldiers found me I was delirious and coughing up blood. I do not remember anything until waking up the following day in the Kuwait Soldiers Hospital. My face and lips were burnt and my throat was sore to the point I couldn't swallow anything. I was there for almost a week getting antibiotics intravenously. The doctors had no explanation why I was sick or why my face and lips were burnt so badly. The day I was released from the Hospital I returned to Qarmat Ali with Charlie Company 2nd platoon. Upon my return to QA numerous soldiers were complaining of the same symptoms I was experiencing. I prescribed those soldiers antibiotics, however the symptoms persisted. At the end of June 2003 the Indiana National Guard relieved us of our duties. Our unit moved into northern Iraq. The nose bleeds subsided a little, but the nausea was still present daily.

After leaving Iraq in April 2004 I went to the VA Clinic in Clarksburg, WV to talk to the doctors about my skin rashes and lesions, stomach problems, and nose bleeds. The doctors were unable to determine what the cause is of these problems were. In 2009 I received a letter from the WV national Guard stating we were possible exposed to Sodium Dichromate while serving at QA, and the VA doctors believe that this could be what's causing my health issues, but because they know little about Sodium Dichromate they are researching and trying to figure out the affects of it on the human body. I know for a fact that Sen. Rockefeller is giving veterans and soldiers alike, much needed support through the VA system in WV.

Once again I would like to thank you all of you for hearing my testimony.

Chairman AKAKA. Thank you very much, Mr. Powell, for your testimony. I would like to say thank you again to our first panel.

Many of you have given heartfelt testimony regarding some very, very personal issues that have affected your lives.

I know I speak for the entire Committee when I say that we appreciate your presence here today. I would like to ask my question to four of our witnesses, Mr. Partain, Mrs. Pennington, Ms. Paganelli and Mr. Powell.

Are you satisfied with the military's response to each of the exposures you or your family member was affected by, including high-risk lists or high-risk health problems? Mr. Partain?

Mr. PARTAIN. As far as the military's response to my exposures at Camp Lejeune, I would say no. I was diagnosed with male breast cancer in April 2007. My wife found the disease when she gave me a hug before bed one night. Two months later, I discovered that I had been exposed in the womb while at Camp Lejeune. I had no knowledge of my exposures until then. It just happened that my father was watching a newscast and saw a hearing about Camp Lejeune and that is how I became aware of this.

Chairman AKAKA. Ms. Pennington?

Ms. PENNINGTON. Actually, we were disappointed with the doctors at Duke University for orally citing the reasons for my brother's aggressive AML. When pushed, again, they admitted it was definitely due to chemical exposure, but they could not prove it and there was some pushback that they received from the military there at Fort Bragg. I do not know the details to that. They would not elicit any further.

I can tell you the Bumpus family, no, has not received any assistance from the VA or military because Matt ended his service 1 year after—or the disease came to light—1 year after his service. So, the VA has harshly denied the connection between the AML, his service in Iraq, and where he was stationed in Balad.

So no, they are not receiving any benefits from the VA or military and are completely dissatisfied.

Chairman AKAKA. Thank you. Mrs. Paganelli?

Mrs. PAGANELLI. Thank you. I would say on behalf of Atsugi residents, or past Atsugi residents, no, because I really strongly believe there needs to be an accurate registry and so many families are not informed. I just really would like there to be a registry for these families and benefits for those who, further down the line, need them; some acknowledgement for that. Thank you.

Chairman AKAKA. Thank you. Mr. Powell?

Mr. POWELL. I think the Army did, or the Department of Defense did kind of lack an acknowledgement that we were even exposed later—about 5 years later—after we returned home. It was kind of an eye opener I will tell you. I guess we go to the VA and the VA has no idea what is going on with us, and they still are kind of timid on what to say, whether it was exposure or anything like that. They just are just trying to back away from it.

So, we are all pretty disappointed. We are on a registry, but the registry to us still does not say that you guys were exposed; and a lot of the soldiers who tried to put in claims for the chemical exposure got denied.

Chairman AKAKA. Dr. Gibb, how well do you think the Army understood the scientific literature associated with the exposure at Qarmat Ali?

Mr. GIBB. I do not think they understood it very well at all. Their statements by CHPPM that—well, they put a great deal of emphasis on the blood tests and the blood tests at that period of time were essentially worthless.

As to how much exposure they could have had, they could have had fairly high exposure that might not have even have shown up in the blood test. They made a statement in their report that some people exposed to very high exposures for more than 2 years had developed lung cancer, but that is not—I think at the time in 2003, the leading study, and I hope to say this with modesty, was my study on chromium—sodium dichromate exposure. That would have told them that we had people exposed for less than 2 years that developed lung cancer.

And also the statement about that most of the—98 percent of the samples were within or below the limit of detection, yet they could tell you that the exposure was between 5 and 8 micrograms per liter. I do not know how they could say that. I mean, I do not know what that means.

I have shown that to other Ph.Ds and M.D.s; they cannot understand it. I mean, if M.D.s and Ph.Ds cannot understand what they are telling you in their fact sheet, how is the soldier who is not trained to understand these supposed to understand it?

So, I think that the information—I mean, I have put together these kinds of fact sheets at the Environmental Protection Agency and press releases and it is important not to scare people unduly. But, it is also important to put the correct information out there and I do not think they did that.

Chairman AKAKA. Thank you, Dr. Gibb. I now turn to Senator Burr, for his questions and we will follow that with Senator Rockefeller.

Senator BURR. Thank you, Mr. Chairman. Dr. Feigley, your subcommittee was asked, number 1, to review the adequacy of the methods used to assess risk, the uncertainties identified, the risks to susceptible subpopulations such as pregnant women, young children, the scientific validity of the conclusions drawn. Number 2, recommend, depending on the evaluation, research to fill data gaps and options for mitigating the risk associated with exposure to incinerator emissions.

Was the NRC subcommittee asked to review the final NEHC report?

Mr. FEIGLEY. No, not to my knowledge. I will have to pass that off to some other folks back here from the NRC, but our committee was not asked, let me put it that way.

Senator BURR. So, the subcommittee's recommendations—you do not know whether any or all of the recommendations were taken into account from the draft report to the final report?

Mr. FEIGLEY. I do not.

Senator BURR. OK. Let me ask you, if you contracted with the NRC—if you were not on the subcommittee and you were going to contract with the NRC for that particular site, would you have limited the NRC review to the scope that the subcommittee was limited to?

Mr. FEIGLEY. No, and in fact, I think we say in the report that we thought that the Navy should have used the NRC to review

their plans for doing their sampling. We recommended they do a comprehensive sampling at the base, a comprehensive risk assessment. However, I think they should have asked us to—us being NRC, not—I am not part of NRC, but I am just a volunteer. But I think they should have asked NRC to actually review their plans for doing the sampling because then I think a lot of things that we had—the negative things that we said about their report would have been said before they did the study and they could have corrected them.

Senator BURR. Therefore, it is pretty difficult to believe that you could go back and reconstruct without reviewing in total the risks?

Mr. FEIGLEY. There are some bright spots in what we saw that we thought perhaps further analysis might have revealed, especially some of the air quality modeling and the correlation between air quality modeling and the measurements that they did on the facility that could have revealed some things.

Senator BURR. Let me get into thresholds and then Dr. Gibb, I am going to turn to you for your prior work—the 26 years at EPA.

Mr. GIBB. Twenty-nine.

Senator BURR. Twenty-nine, excuse me. Thank you for that service. An observation question. Is the threshold for risk at EPA different than the threshold for risk at the NRC?

Mr. GIBB. I do not have an answer to that question. I mean, there is——

Senator BURR. Let me ask it in a different fashion. If it were different, would you find that to be a flaw? Shouldn't the threshold for risk at both—which both assess the risk on a human population and U.S. population—shouldn't that be the same?

Mr. GIBB. That is a rather tricky question.

Senator BURR. Well let me ask it in a more specific way. Should the NRC look at benzene differently than the EPA does?

Mr. GIBB. I think the answer to that is no; I do not think they should look at it differently.

Senator BURR. OK, I just wanted to clarify that. Now, Dr. Nuckols, before I ask you a question, I would like to ask the Chairman, after the NRC issued its report on Camp Lejeune earlier this year, other experts—including Camp Lejeune Community Assistance Panel, a group of five scientists, and the National Resource Defense Council—released documents criticizing the report. I would ask unanimous consent to include copies of those documents in the hearing record.

Chairman AKAKA. The documents will be included.

[The information referred to can be found in the Appendix.]

Senator BURR. In one of those documents I just mentioned, Dr. Nuckols, it was noted that the National Research Council's Hazard Evaluation in the Camp Lejeune report, and I quote, "did not take into account that benzene and vinyl chloride were contaminants in drinking water at Hadnot Point or Tarawa Terrace."

I guess I would ask you, is that accurate and can you explain benzene and vinyl chloride; what they are and what NRC sees as their hazard?

Mr. NUCKOLS. First of all, hazard evaluation, in my mind, has a very specific definition and there is a portion of the report in

which a hazard evaluation was conducted. Is that—I just want to make sure that is what you are referring to?

Senator BURR. Eventually where I am going to get to is that the basis of what the NRC subcommittee found, and I am reading out of your testimony, it says, "to evaluate the potential health effects to exposed residents, the committee undertook four kinds of reviews to determine what kinds of disease and disorders have been found to result from exposure to TCE and PCE, not to benzene or vinyl chloride."

So, the obvious thing is, did you take into account when you were assessing the risk to individuals exposed on the base to the groundwater contamination to the two chemicals of benzene and vinyl chloride?

Mr. NUCKOLS. In the hazard evaluation that was conducted by a subset of the committee, which I think was in the toxicology subgroup that I mentioned, I do not think that benzene or vinyl chloride were considered.

In the overall report, the charge, in my understanding and I think the majority of the committee, was the underlying words "a causative relationship." The process that we took toward that was—in my group, which is in my summary, I pointed out—was to try to make a determination of the extent of chemical contamination, where it was, what chemicals, and so forth.

In the initial work of the committee, a lot of focus was made on PCE and TCE because they had been the principal contaminants, the primary contaminants that were the focus of the ATSDR study and their risk assessment.

Senator BURR. So, can I conclude from what you are saying that you did not assess in the same manner benzene and vinyl chloride as you did TCE and PCE?

Mr. NUCKOLS. It was not included in the hazard evaluation. I am fairly certain of that. Where I was going with my response was that in the exposure assessment group we came across more information about benzene being—occurring—in the aquifer; that there were samples there that would lead us to believe that there was exposure.

Our job, if you want to think of that group, that subgroup, was to provide chemicals to the toxicologists and the epidemiologists for their evaluation and we did, I think, include those, although they were not as rigorously examined as PCE and TCE.

Senator BURR. Listen, I am in full agreement with you. The limitations that were on the NRC are prescribed in what you have been asked to look at and I think Dr. Feigley just confirmed that in another study. So, can I conclude that review of toxicology studies, epidemiological studies, and conduct of a hazard evaluation did not take place for benzene and vinyl chloride in the same fashion, if at all, as TCE and PCE?

Mr. NUCKOLS. The procedure that was used by the epidemiologists and the toxicologists was to review published studies of whether there was causation between these chemicals and disease. They left it open pretty much to what was out there in terms of what we knew about the relationship.

To my knowledge, both benzene and vinyl chloride were considered in that way. They were not considered in the hazard evaluation that is published in the report.

Senator BURR. I would only point this out that—I think this is at the root of part of the misunderstanding, was it or wasn't it? I would even think that if it was, it would be in your testimony. It would be stated clearly in the report. But you only referenced TCE an PCE and there are these two other chemicals that I think Dr. Gibb would agree, are known carcinogens that under any study of the adverse health effects of contamination you could not exclude. And if you came to a conclusion that they play no part, it would be a need of the report to explain why because the EPA's own scientific information says that there is a direct cause to benzene and vinyl chloride contamination.

Mr. NUCKOLS. Can I respond to that, sir? First of all, I think that if you end the report, we do specifically list benzene and vinyl chloride as being——

Senator BURR. Present.

Mr. NUCKOLS [continued]. Contaminant—well not just present, but contaminants of concern, chapter two. Read the conclusions of chapter two, Contaminants of Concern, and there is, in my mind, no place in the report that says these should not be studied; that they are not an issue. It is not there.

There is, in fact, information about what studies are out there on benzene and vinyl chloride in—I think it is in the appendix to the study and that was because—and I agree, it was late coming on board in the time period that we were working on the report as to whether or not it was an issue of concern. ATSDR in their first risk analysis said that benzene was not of concern.

But I think one of the important things that is overlooked in this report is that we have identified contamination and chemicals that were previously maybe not looked upon as being primary contaminants of concern at Camp Lejeune.

Senator BURR. The Chairman has shown me great latitude and if the Chairman would allow me to ask one more question, I will not have to go to a second round. Unless the Chairman intends to go to a second round, I will wait.

Chairman AKAKA. I Intend to do a second round.

Senator BURR. You—no, go ahead, Jay.

Chairman AKAKA. Go ahead. Continue with your question, Senator Burr.

Senator BURR. I did not want to neglect Mike, since he is directly affected by Camp Lejeune. Mike, let me just ask you, what actions would you like to see Congress, the Department of Defense, and/or Veterans Affairs do with regard to the exposures you are faced with and others have been faced with at Camp Lejeune?

Mr. PARTAIN. Before I answer that, may I interject something on the previous conversation you were having with Dr. Nuckols?

Senator BURR. Yes, sir.

Mr. PARTAIN. Dr. Nuckols was referring to ATSDR's work—that they had relied on ATSDR, he started to say, I believe, regarding the public health assessment. One thing I would like to point out concerning both ATSDR's public health assessment and the work that the National Resource Council did with Camp Lejeune, was

that they had incorrect data concerning the benzene and vinyl chloride.

More importantly, ATSDR, in their public health assessment, did not address benzene and that was one of the reasons why that document was basically withdrawn from public view in April of this year. So, they did not evaluate benzene with the correct data and that data was not given to the NRC. They, even in their tables, have the incorrect levels for the—they omit the July 1984 readings.

To answer your question, we would like to see a full disclosure of what transpired at the base relating to the drinking water contamination. To accomplish that would mean the full cooperation of the Department of the Navy and the U.S. Marine Corps by disclosing all documents, plus full funding of all ATSDR's initiatives concerning the Camp Lejeune studies.

With the existence of documented exposure levels, any person who is now or was suffering from the effects of their exposures at Camp Lejeune, they should be giving medical care or compensation for their past suffering and disabilities. And for those who have lost loved ones, they should be afforded restitution.

Senator BURR. Mr. Chairman, I want to again thank you for what I think has been a very insightful panel. I want to thank the witnesses for their very personal testimonies, the experts that we have, for their insight and knowledge, and the Chair for his indulgence. I apologize to Senator Rockefeller.

Chairman AKAKA. Thank you, Senator Burr, for your questions. Now let me call on Senator Rockefeller for his questions.

STATEMENT OF HON. JOHN D. ROCKEFELLER IV, U.S. SENATOR FROM WEST VIRGINIA

Senator ROCKEFELLER. Thank you, Mr. Chairman. I will submit my statement for the record and go directly to questions.

[The prepared statement of Senator Rockefeller follows:]

PREPARED STATEMENT OF HONORABLE JOHN D. (JAY) ROCKEFELLER IV, U.S. SENATOR FROM WEST VIRGINIA

I want to thank the Committee for convening this important hearing. We have a responsibility to make clear to the DOD just how important it is to prevent exposures when possible, and to work with the VA to immediately notify and provide care for our veterans if they have been exposed—as soon as possible, not years after the fact.

I am very proud that a former Staff Sergeant and medic in the West Virginia Army National Guard, Russell Powell, is here today, willing to step up and talk about his personal experiences as hard as that may be. The fact that his West Virginia National Guard Unit was deployed to Basra to provide security for contractors at the Qarmat Ali water treatment plant is part of the tough job our troops face.

The fact that they were not warned of or protected from exposure to Sodium Dichromate—a dangerous chemical—is an enormously serious problem.

The exposure was not public in West Virginia until this year when I learned of the problem. I wrote both the Secretary of Defense and the Secretary of the Department of Veterans Affairs for information and a report on what was being done to help exposed veterans.

We have been here before. In 1993, as Chairman of the Senate Committee on Veterans' Affairs, we investigated the possible causes of what was then referred to as "Gulf War Syndrome."

I was deeply disturbed by senior Pentagon officials' dismissal of serious health concerns then, and I am enormously worried today, that we may continue to get that same approach from the Pentagon. Even after it evaluated the site at Qarmat Ali, the Department of Defense failed to notify exposed National Guard members on time.

This much is clear: DOD and its contractors have failed to meet their responsibility to our men in uniform. They have failed to be honest and forthright about the risks. And they have failed to do everything within their ability to reach those exposed.

Qarmat Ali took place in 2003: we still do not have all the answers and we still have not reached all of the guardsmen. Six years is simply unacceptable.

While DOD couldn't find and notify many West Virginia guardsmen, my staff worked with a number of executive branch agencies in collaboration with Secretary Shinseki to try to forward critical information to exposed West Virginia Guard members they had on file.

But it should not require a U.S. Senator and his dogged staff to get this information to the men and women who need it so urgently.

However, VA testimony suggests that the Department is taking the Qarmat Ali exposure seriously and working to revise the testing in the VA registry and considering how it will handle claims for benefits and care. (See October 8, 2009, letter and Attachment from Secretary Shinseki that follows.) This is promising, and my staff and I will monitor each effort carefully to be sure the Russell Powells and their colleagues get the care and support suggested and earned.

This has been a cornerstone of who I am as a person and as a legislator throughout my career and I will never stop the fight for our men and women who serve.

With so much at stake, we must share the truth as soon as possible. Only then can we continue to track and learn about the illness to provide our veterans the care they have earned and deserve, the best care possible.

ATTACHMENTS

THE SECRETARY OF VETERANS AFFAIRS
WASHINGTON

October 8, 2009

The Honorable John D. Rockefeller IV
United States Senate
Washington, DC 20510

Dear Senator Rockefeller:

Thank you for your co-signed letter regarding the Department of Veterans Affairs' (VA) actions in response to a potential exposure of National Guard members to hexavalent chromium at Qarmat Ali, Iraq from April to October 2003.

VA has been proactive in its response to this exposure event. There are approximately 600 National Guard members, primarily from four states, who may have been exposed to sodium dichromate (a source of hexavalent chromium) while serving at Qarmat Ali. In June 2008, when we first learned of this exposure, all VA Environmental Health Coordinators who run the registry program were provided background information about this issue and were instructed to offer a Registry examination to all Veterans who were potentially exposed to sodium dichromate in 2003. In addition, local VA staff is participating in meetings held by the National Guard to provide information about enrolling for VA health care, scheduling a health registry examination, and obtaining details about other VA benefits.

We have the names and contact information of all National Guard members present at Qarmat Ali. We have also verified the numbers of these Veterans who have received a Gulf War Registry (GWR) examination. The enclosed Fact Sheet provides a State-by-State breakdown of those numbers. In addition, many of the Guard members have also enrolled in the VA health care system.

We are in the process of augmenting the GWR to reflect service at Qarmat Ali. The involved Guard members who have had an initial examination will be recalled to have a complete exposure assessment, as well as a more targeted physical examination and ancillary testing looking for indications of health outcomes that may be related to hexavalent chromium. Those who have yet to enroll in the GWR will get this targeted examination initially. They will also receive a chest radiograph and pulmonary function testing. This evaluation will be repeated periodically (every year for examination and every 5 years for chest radiograph).

All of this testing can be done within the authority granted for the GWR, therefore the loss of treatment eligibility 5 years post discharge is not an issue. The Veterans Health Administration is working with the Veterans Benefits Administration to develop an expedited process for service connection for those individuals who have a history of exposure and health outcomes that are known to be related to hexavalent chromium.

Page 2

The Honorable John D. Rockefeller IV

Once we have made these modifications to the GWR and have established the appropriate process for the involved VA medical centers, the Department will send letters to these soldiers explaining the new process and details regarding how they can get their examination.

I hope that this answers your questions regarding how VA is responding to this exposure event. Thank you for your continued support of our mission. A similar letter has been sent to the other co-signers of your letter.

Sincerely,

Eric K. Shinseki

Enclosure

Fact Sheet

Veterans Exposed to Sodium Dichromate and included in Gulf War Registry

State	# Enrolled in Registry	#Total Reservists at Qarmat Ali	# Remaining
West Virginia	27	128	101
Oregon	20	292	272
South Carolina	7	146	139
Indiana	117	136	19

This information is current as of September 2009

Senator ROCKEFELLER. I want to focus on you two, but I want to do it in a different fashion. Senator Burr's questions were so good because they were so specific—related to different toxins and the effect and what was included in this study and that study.

What fascinates me but angers me so much is that as I said—and you will remember this, Russell, from our August hearing—is there is such a direct comparison between this and the Gulf War Syndrome: the denial on the part of the military, their refusal to not only respond to soldiers whose lives are being shredded, could not sleep, could not keep marriages, could not get jobs, could not read newspapers because they were being told to take a pill which had never been cleared by the FDA for animal use much less for human use to protect them from what they thought Saddam Hus-

sein was going to do. And it turned out actually that it was the wrong pill anyway. It was for the chemical he did not have.

But that is another matter. But the refusal—I want to get into the military culture. I know the military is in the next panel. I am not going to be here on the next panel. But you are a medic, Russell, and you are a good one. You have been through this, you come, you testify, and you tell us what you are going through; and you have seen the letter from Eric Shinseki that he sent this morning.

Mr. POWELL. Correct.

Senator ROCKEFELLER. Which has some promise to it. He says he is going to give full pulmonary tests, and in West Virginia we have discovered all of those people who were not on the registry or were not yet found. In Indiana, I am not sure they have. They have a lot more of them, but I am not sure they have discovered all of those.

But when you got into that situation with the orange dust and being a medic with some stature, you went over to that place to lie down and try and give yourself an I.V. and all the rest of the story, it says something about a soldier's—well, first of all, it says something about the military's inability to deal with something that might either be embarrassing for them or for which they cannot explain, perhaps because they are busy fighting wars, which is a rather large task.

On the other hand, there are people who are doctors and who have medical responsibilities in the military who are not fighting wars; they are taking care of soldiers. There is something which prevents—and I have heard this in other sessions about other types of problems—soldiers taking on the military even as they suffer.

I want to talk about that for a moment. From your point of view—first of all, I understand the chain of command. I understand that from my point of view this is kind of redundant. You went through this in 2003?

Mr. POWELL. Correct.

Senator ROCKEFELLER. And nobody discovered what you had until 2009. What is the culture problem we are dealing with here?

Mr. POWELL. I do not think the Army knew fully—was fully aware of the chemicals being on the ground through KBR not actually providing them with that information. But the Army could have told us a little bit sooner whenever they did find out, in August 2003, but they did not. They did not tell any of the soldiers. There is a soldier that I talked to who is a government employee who just found out recently that he was one of the guys exposed to chemicals. He is a government employee and they were saying they could not find this gentleman. This is the Department of the Army saying they cannot find him.

Well, one of the high-ranking officers from West Virginia was on an aircraft with him, this was a month or two ago, and still that individual—because I cannot really tell you what he does for the government, but he was talking to one of our generals. He told the general that he was in the 1092nd Charlie Company and the general did not say well maybe you might want to look at this or look at that. He was just dumbfounded until we linked up with that individual through e-mails while trying to find all of our soldiers.

Because we are trying to do our best to find out where our people went and give them the heads up on their actual medical problems, assuming a lot of them are having medical problems and just didn't know why. When you go to the VA or anything like that, it is so horrible because you say you are a medic, a flight medic, they kind of look down on you in a sense because they say well, you already know everything Mr. Know-it-all. That is how most of the physicians act.

We are not even trying to do that. We are saying hey, this is what is wrong with me. I am pretty sick. I am not faking the funk with you. I was doing medicine for a lot of years. I am not trying to get over on you.

It is real frustrating because they are just kind of brushing us off.

Now there are a few doctors that are really concerned and are actually trying to figure out the problems relating to those chemicals, but most of them at the VA just kind of brush me off. It is really a hard obstacle to get through.

Senator ROCKEFELLER. Dr. Gibb, do you have any thoughts about that? Why is it that people, strong men like Russell, cannot—they look down at a medic—some doctors are good, some doctors are bad or whatever?

I mean, for heaven's sakes, they knew they were going to send you to this camp, to Qarmat Ali, and therefore, they had to have been there. Therefore, the fact of there being some orange dust must not have escaped them unless they were color blind. So, I do not understand that.

There is a lack of thoroughness or a lack of concern, a lack of care. I mean, if you saw the orange dust, knowing what you now know and knowing what the world now knows 6 years later, it is not very complicated to me. They were entering into a risky environment and chose not to know about it, not to warn about it, not to take steps to clean it up or to do whatever.

Now Dr. Gibb, do you have any thoughts on that?

Mr. GIBB. I think they had a significant exposure there. I mean, some of the soldiers described it looking like orange powered donuts and it was all over the ground. Statements of the soldiers at the previous hearing indicated that it was everywhere.

I think that—and the bags read sodium dichromate. It was not like guessing. So, they should have known and it should have been reported. Again, I do not think there was a good understanding of what sodium dichromate was or what its effects were. So, I think there was a significant exposure that should have been addressed immediately, as soon as they learned what it was.

I think that there was just—I feel like it was dealt with irresponsibly. I cannot think of a better word.

Senator ROCKEFELLER. Let me be a little tougher about it then. Doesn't the military have a responsibility, particularly when you are not in a huge situation which varies a lot like the second world war or the first world war, you know, like those, instead you have a particular type of territory where there are certain factors which are common for all of that territory—Basra, I guess, was where you were—and then there is this orange dust. I do not understand that.

I do not understand why, if there are doctors who are in charge of the health, are they not in the deployment decision process in any way? Are they left out until somebody does get sick? Is there anybody here who can answer that question?

Mr. GIBB. Again, I think that the knowledge of industrial hygiene is critical. I mean, you could recommend pre-deployment physicals and post-deployment physicals and all those kinds of things, but if you do not understand what substances you are dealing with, those kinds of physicals are not going to get the kind of information that you need.

So, I think this was a lack of understanding of the industrial hygiene, the environmental health, and then the follow-up to that was, it was just sort of like do not worry about it, it is OK. That, to me, is just—I do not want to say unconscionable, but I think it is—this is a very serious substance. This is a very potent carcinogen. This is a very irritating substance. You do not have to look very far to find information about the effects of sodium dichromate.

It is not some arcane chemical that we do not know about. We have known about the carcinogenicity of sodium dichromate since the early 1950s when the Public Health Service did a study of all the chromium production plants in the United States and reported huge lung cancer risks from the substance and the irritation of it. So, it has been known for a long period of time.

I think, first, not having the knowledge to say well, we have soldiers in the facility and they are using this particular chemical, it is called sodium dichromate. What is sodium dichromate? Then you have to take steps to address that. I mean, this particular situation with the thousands of bags was that of 100-pound bags broken out, open and the dust blowing all over the place and everybody reporting orange dust. That should have been cause to say, this is a serious situation; we need to do something right now.

And then to follow up to say, well, sodium dichromate is not that bad. You have to be exposed for high concentrations for about 2 years to get lung cancer. Do not worry too much about it, the blood tests do not show anything. The blood tests essentially were worthless at that point.

Blood tests might have even been worthless when they were being exposed because it takes a fair amount—it takes a large amount of hexavalent chromium to show concentrations in the blood. So, I think that the follow-up, the organization going into it, was inadequate. The follow-up was inappropriate. I mean, the soldiers deserve better than that.

I think I would say what happened was a disservice to the soldiers. Disservice is putting it mildly. It was wrong.

Senator ROCKEFELLER. It is shocking. It is just shocking. I have said before, maybe the last time, the very first Veterans' Committee meeting I ever attended 25 years ago, there was a soldier who had been sent into that part of the Pacific where they were testing the atomic bomb. He described what it was to be dying having served your Nation, having followed orders way back then, when things were I guess a lot more primitive, but maybe not. He said it is just an amazing feeling to have your government say to you, well you cannot prove that your cancer was caused by your being in at that time, when we all know—and if you are a West

Virginian like Russell Powell, you know if you have been in a coal mine for 10 years you have Black Lung; you just have it. You do not need proof of it, you have it. There is a presumption of it.

But we make the soldier prove everything, and then along comes Agent Orange. I was at that hearing when Admiral Zumwalt—nobody was paying any attention to Agent Orange. People were dying all over the place of the same thing, cancer. But when Admiral Zumwalt came up there and testified and said that his son had died or was in the process of dying from cancer, oh, then everybody got really alert and we started making good, so to speak, on people who had Agent Orange exposure.

That is the wrong way to do things. The military is meant to know that stuff. And then we had the Gulf War Syndrome, which the military took I think something like 17 years to admit that they were wrong. We did a lot of studies and a lot of investigation on that when I was sitting in Dan Akaka's seat. But they did not pay any attention.

That same infuriating indifference to soldiers, meaning assuming that soldiers would be making excuses as opposed to soldiers having real medical problems that they had not taken the time to disclose because the order of battle may be presumed to be more important. But on the other hand, these are doctors and they are ignoring the symptoms. They are writing us letters saying, take an aspirin and go home, or you have a virus, go home, sleep, get some good sleep. It makes me mad.

What scares me is that I do not know that the culture has changed. Now I get this letter from Shinseki, which you have seen, Mr. Powell, and I think you and I both think it is pretty good—that involved Guard members who have had an initial examination will be recalled and will have a complete exposure assessment as well as a more targeted physical examination and ancillary testing looking for indications of health outcomes that may be relevant to hexavalent chromium.

Those who have yet to enroll in the Gulf War Registry—I like that part—will get this targeted examination, initially. They will also receive a chest radiograph and pulmonary function testing and that will be repeated every year and then every 5 years.

So, I think the Veterans Administration—you know, I am a fan of Shinseki. I have no problems saying that. But he is on the receiving end of this. The doing in was with the military and I do not get why they do not learn. Maybe I am wrong, but until somebody shows me I am wrong, I am just mad.

Please.

Ms. PENNINGTON. Senator Rockefeller, I would just like to add what I neglected to mention when Chairman Akaka asked me if we were satisfied with what the military and the VA did with Sergeant Bumpus and my brother, Staff Sergeant Ochs. I need to tell you that my brother, upon return from his third tour in Iraq in the end of April 2007, suffered from flu-like symptoms almost immediately.

He went to Womack Hospital at Fort Bragg, NC, three times. The doctors did exactly what you just said. They said you have some type of virus. They sent him home with 800 milligrams Ibuprofen. So, it was not until September 2007 when he had to get

special permission to be seen by a private hospital where the private hospital actually discovered that my brother had AML.

I would also like to add that Sergeant Bumpus had a private doctor, Dr. Tim Grennan, do a chromosome analysis on the initial blood drawn before Matt underwent chemotherapy. He discovered chromosome mutations that would only happen if he was exposed to chemicals and this was something that you would see only after one receives chemotherapy.

So, I just wanted to go on record and let you all know that. Thank you.

Senator ROCKEFELLER. Well, Mr. Chairman, I have over—well, the timer has just gone flat to 0.00, so I guess I am in real trouble. But those of us in Congress get military health care and we go down a few flights from here to get it. There are a lot of doctors and Bethesda Naval Hospital available to us for whatever.

It would be sort of nice and sort of important if your family and friends seeing your situation all felt like you could get the same thing. I have no reason to think there is anything that we are doing here more important than what your loved ones were doing and what you were doing in terms of the welfare of the Nation. Dr. Miller, please.

Dr. MILLER. You know, I think when a soldier finds himself in a combat situation, there are a lot of unknowns and some things you cannot anticipate. But in the group that I have taken care of, there was a clear danger after it was identified and I thought that there was dissemination of inaccurate information to downplay what happened.

For example, there was a memo sent out to the soldiers exposed in the 101st Airborne that said sulfur dioxide is not a problem. It has no known serious side effects and it is not a carcinogen. They had measurements that the levels were toxic, well above the military's baseline of 13 parts per million, and they found them as high as 120 parts per million.

Then there was a second report out from the 62nd Medical Brigade Preventative Medical staff that said that you would only have problems if you were exposed to 400 to 500 parts per million, which would do us all in. I think that there are things that you cannot anticipate, but when you do identify them, you have to make sure that the disseminated information is accurate.

Senator ROCKEFELLER. OK, well I have gone way over my time, but I guess this letter, I do not know if it is available. I mean, it came in today. Ordinarily, I would be cynical and say well that is good timing, but I am not in this case because it is from General Shinseki and I think he is trying to do the right thing.

There has always been a lack of coordination between the Department of Defense and the VA. One does everything on paper and the other does everything on IT medical records. It is a terrific health care system. I do not know how they coordinate. I do not know what has changed.

Americans by nature react to episodes and then we sort of forget them. It is like—a little bit like when we go to war. We go to war, we win it, we tie, we lose it, or whatever; then we come home and sort of let everything military deteriorate. I just think in the case of the care of veterans, it would be nice if we had more activity on

the front end rather than waiting to have the VA try to clean up what the military failed to do, and that is just my point of view.

I thank the Chair and I thank all of you, a lot.

Mr. PARTAIN. Mr. Chairman, if I may.

Chairman AKAKA. Mr. Partain?

Mr. PARTAIN. When Senator Rockefeller was discussing the orange dust in Iraq at the facility out there and heard about the Atsugi Air Station in Japan, it befuddles the mind. It is almost like common sense: there is orange dust; someone should look into it. I know in our case at Camp Lejeune, our issue was solvents in our drinking water and in our research through the documents we came across an order, a Marine Corps order from the commanding general of the base, which identified organic solvents as a hazardous material and further stated that improper practices and disposal practices create hazards such as contamination of drinking water.

From the very beginning, from the first public announcement in 1984, to the residents and personnel aboard Camp Lejeune, the Marine Corps has maintained that they were in violation of Federal and State regulations. What they have failed to tell the public and everybody was that they were in violation of their own orders.

This order I am referring to dates back to 1974 and it is the third order in a series. We have not found the other two. They have not been produced, but we suspect they may go back to the early 1960s. It just almost seems like common sense. Organic solvents, they are listed in there as something that is hazardous, and then if you dispose of them improperly, they are going to end up being in the drinking water.

Well that is exactly what happened at Camp Lejeune. Where is the common sense? Thank you.

Chairman AKAKA. Thank you very much. I want to thank the witnesses in the first panel for sharing your personal experiences with us today. Again, this will be helpful to the Committee and we look forward to dealing with these problems that have been mentioned.

Thank you very much, again, and I will call up the second panel.

[Pause.]

Chairman AKAKA. This hearing will be in order. I want to welcome our principal witness from VA, Dr. Michael Peterson, who is the Chief Consultant on Environmental Health for the Strategic Health Care Group at the Veterans Health Administration. He is accompanied by Dr. Stephen C. Hunt, the National Director for the Post-Deployment Integrated Care Initiative at VHA, and Bradley G. Mayes, the Director of the Compensation and Pension Service at the Veterans Benefits Administration.

The next witness on the panel is Dr. Craig Postlewaite, Acting Director, Force Health Protection and Readiness Programs and Director, Force Readiness and Health Assurance at the Department of Defense. Next we have Dr. Paul Gillooly, who is the Public Health Assessor at Navy Marine Public Health Center.

We also have Maj. Gen. Eugene Payne, Jr., the Assistant Deputy Commandant for Installations and Logistics for Facilities with the Marine Corps. Our final witness on the second panel is John Resta,

Scientific Advisor, U.S. Army Center for Health Promotion and Preventative Medicine.

I thank you all for being here this morning. Your full testimony will of course appear in the record. Mr. Peterson, will you please begin with your testimony?

STATEMENT OF MICHAEL PETERSON, DVM, M.P.H., DRPH, CHIEF CONSULTANT, ENVIRONMENTAL HEALTH, STRATEGIC HEALTHCARE GROUP, OFFICE OF PUBLIC HEALTH AND ENVIRONMENTAL HAZARDS, VETERANS HEALTH ADMINISTRATION, U.S. DEPARTMENT OF VETERANS AFFAIRS

Dr. PETERSON. Good morning, Mr. Chairman, Ranking Member and Committee Members. Thank you for this opportunity to discuss what VA is doing to support veterans with environmental exposures that occurred during military service. As you indicated, I am accompanied by Dr. Hunt and Mr. Mayes this morning.

VA recognizes that servicemembers sometimes face exposures to toxicants or materials in the course of their military service that can have deleterious health effects. We have developed a robust program within the Office of Public Health and Environmental Hazards to address this need by: identifying potential sources of exposure in at-risk veterans; informing veterans and health care providers; and offering treatment and care for service-connected conditions.

My written testimony provides background information about initiatives within VA to address these concerns, explains how VA works with DOD to identify and respond to environmental hazards and describes the four specific exposures cited earlier and actions taken by VA in response.

I would like to spend the few minutes I have addressing how VA and DOD collaborate on not just these exposures, but any possible environmental hazard and how we help veterans receive the health care and benefits they deserve. One of the many lessons that VA has learned from experiences with Agent Orange and Gulf War veterans illnesses is that information regarding possible exposures to environmental agents and other toxicants both within the combat theatre and other areas in which our troops operate must be received and acted upon by VA as early as possible.

Up-to-date information on these situations is invaluable to VA's ability to identify veterans who may have been affected by an exposure, evaluate their individual risk of exposure, and for sequelae provide appropriate medial surveillance and mitigate untoward health effects that are known to be caused by these toxicants.

In addition, where the possible outcomes are not known, it is important to perform epidemiological studies on exposed troops. This will better provide information than performing retrospective studies once it is determined that adverse health outcomes are being ascribed to a potential exposure.

To this end, the joint DOD/VA Deployment Health Working Group was established. This working group reports to the Joint Executive Council through the Health Executive Council. The objective of this group is to identify and foster opportunities for sharing information and resources between VA and DOD in the areas of de-

ployment health surveillance, assessment, follow-up care, health risk communication and research and development.

Each year this working group discusses deployment-related concerns and develops strategies by which to address them. The Deployment Health Work Group meets monthly to discuss a wide-ranging array of exposure issues, including those dating to the World War II era. The Deployment Health Work Group also actively seeks to discuss and recommend coordinated action to identify involved servicemembers, establish a determination of risks for this population and develop methods of outreach, risk communication, and where necessary, medical surveillance and appropriate health care for veterans with any condition that may have resulted from these exposures.

Mr. Chairman, VA understands these issues are very important to you, all the Members of this Committee, and to veterans and their families. I can assure you VA is equally concerned and committed to working with DOD and other agencies to identify potential hazards, inform veterans of any risks to their health, develop appropriate responses, and deliver needed care and benefits to veterans and their families. Only through such cooperation will VA be prepared to deliver the proper health care and disability compensation benefits to those entitled.

Before I conclude, I would like to tell you about a new study currently underway that VA is conducting to help assess and identify the environmental exposure risks faced by this latest generation of veterans. VA's National Health Study for a New Generation of U.S. veterans begins with 30,000 veterans deployed to OEF/OIF and 30,000 comparison veterans who were not deployed.

This study includes veterans who served in each branch of service representing active duty, National Guard and Reserve members. Women are being over sampled to make sure they are represented and comprise 20 percent of the study. The study compares the deployed and non-deployed veterans in terms of chronic medical conditions, TBI, PTSD, and other psychological conditions, general health perceptions, reproductive health, pregnancy outcomes, functional status, use of health care, behavioral risk factors and VA disability compensation.

This research will help us identify what conditions are disproportionally found within the deployed population, which can help us then provide an evidence base for health care treatment and possibly serve as presumption for benefits.

Thank you again for the opportunity to testify. My colleagues and I are prepared to address any questions you or the Committee Members might have.

[The prepared statement of Dr. Peterson follows:]

PREPARED STATEMENT OF MICHAEL R. PETERSON, DVM, MPH, DRPH, CHIEF CONSULTANT, ENVIRONMENTAL HEALTH, STRATEGIC HEALTHCARE GROUP, OFFICE OF PUBLIC HEALTH AND ENVIRONMENTAL HAZARDS, VETERANS HEALTH ADMINISTRATION, U.S. DEPARTMENT OF VETERANS AFFAIRS

Good morning, Mr. Chairman, Ranking Member and committee members. Thank you for this opportunity to discuss the work of the Department of Veterans Affairs (VA) in responding to certain exposures that occurred during military service, including respiratory exposures from an incinerator near the Naval Air Facility Atsugi, water contamination at Camp Lejeune, sodium dichromate at the Qarmat Ali Water Treatment Plant, and exposures to burn pits during the current conflicts.

I am accompanied today by Dr. Stephen Hunt, National Director, Post-Deployment Integrated Care Initiative, VA Puget Sound Health Care System, and Mr. Bradley Mayes, Director of Compensation and Pension Service, Veterans Benefits Administration.

VA recognizes that servicemembers sometimes face exposure to toxicants or materials in the course of their military service that can have deleterious health effects. We have developed a robust program within the Office of Public Health and Environmental Hazards to address this need by identifying potential sources of exposure and at-risk Veterans, informing Veterans and health care providers, and offering treatment and care for service-connected conditions. My testimony will provide background information about initiatives within VA to address these concerns, explain how VA works with the Department of Defense (DOD) to identify and respond to environmental hazards, and describe the four specific exposures cited earlier and actions taken by VA in response.

VA PROGRAMS SPECIFICALLY TARGETING EXPOSURE-RELATED DISEASE

VA is very concerned about environmental health concerns of Veterans and offers a range of programs including health registries, special training for staff, and education materials including web-based information, fact sheets, and brochures. VA actively monitors and provides support to Veterans and their health care providers concerning a range of potential environmental exposures and outcomes, including Agent Orange, Gulf War Veterans' Illnesses, radiation, toxic embedded fragments including depleted uranium, thermal injuries, mustard gas, noise, vibration, and other physical exposures. More information about these programs specifically tailored to Veterans and health care providers can be found online at: http://www.publichealth.va.gov/exposures/. VA notifies Veterans about these exposures through many different avenues. First, every VA medical center is required to have an environmental health clinician on staff. This person serves as a local resource for Veterans and clinical providers. In addition, the Transition Assistance Advisors (who work for the National Guard and receive training from VA) and Post-Deployment Integrated Care Clinics provide VA-wide expertise in a range of exposures and health outcomes commonly seen in returning Veterans. VA regularly provides letters, newsletters, brochures and other information to Veterans while maintaining registries specifically designed to track and inform Veterans with materials related to their unique health care needs.

VA trains its providers to prepare to respond to the specific health care needs of all Veterans, which in turn helps providers inform Veterans of these risks. This training includes specific Clinical Practice Guidelines on post-combat deployment health and other issues. VA operates three War Related Illness and Injury Study Centers (WRIISCs) that provide specialized health care for combat Veterans from all deployments who experience difficult-to-diagnose or undiagnosed but disabling illnesses. Starting in 2002, the WRIISCs began serving as referral centers for Veterans with undiagnosed or difficult-to-diagnose complaints. Veterans referred to the WRIISCs are provided with a complete exposure assessment, outpatient or inpatient evaluation (including advanced neurological evaluations), and a detailed treatment plan, which is provided to the Veterans' VA primary care providers. Based on lessons learned from the Gulf War, VA realizes that concerns about unexplained illnesses could also emerge after other deployments, and we are building our understanding of such illnesses. Furthermore, as we recognize that many unexplained illnesses or symptoms may be related to exposure to toxicants during deployment, the WRIISCs now provide extensive exposure assessments to patients referred to them.

Following the Gulf War, VA developed the Veterans Health Initiative (VHI) Independent Study Guides (ISG) for health care providers as one of many options to provide tailored care and support of Veterans. These study guides were principally designed for the clinical care of Veterans of the Gulf War era, but have proven highly relevant for treating Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) Veterans, since many of the hazardous deployment-related exposures are likely to be the same. VA developed ISGs for health care providers to deliver appropriate care to Veterans returning from Iraq and Afghanistan that cover topics such as gender and health care, infectious diseases of Southwest Asia, military sexual trauma, and health effects from chemical, biological and radiological weapons. Study Guides on Post Traumatic Stress Disorder (PTSD) and Traumatic Brain Injury (TBI) were also developed and made available for primary care physicians to increase understanding and awareness of these conditions. VHI ISGs are currently undergoing a comprehensive update to make them more relevant to busy providers and to modularize the content so that it is more accessible. The Office of Public Health and Environmental Hazards and the Employee Education System are working together

on this project. VA recently brought on board an American Association for the Advancement of Science fellow with advanced degrees in post-secondary education and computer technology to spearhead this effort.

VA has also initiated a large, long-term study to look carefully at a broad array of health issues that may affect OEF/OIF Veterans and their counterparts who served during the same time period. VA's "National Health Study for a New Generation of U.S. Veterans" will begin with 30,000 Veterans deployed to OEF/OIF and 30,000 comparison Veterans who were not deployed.

The study includes Veterans who served in each branch of service, representing active duty, Reserve, and National Guard members. Women are being over-sampled to make sure they are represented and comprise 20 percent of the study, or 12,000 women. A combination of mail surveys, online surveys, telephone interviews, and in-person physical evaluations are used to collect data from Veterans.

The study compares the deployed and non-deployed Veterans in terms of chronic medical conditions, Traumatic Brain Injury (TBI), Post Traumatic Stress Disorder (PTSD) and other psychological conditions, general health perceptions, reproductive health, pregnancy outcomes, functional status, use of health care, behavioral risk factors and VA disability compensation. VA has contracted with an independent Veteran-owned research firm to collect the data.

Interaction and Information Exchange with DOD

One of the many lessons that VA has learned from experiences with Agent Orange and Gulf War Veterans' Illnesses is that information regarding possible exposures to environmental agents and other toxicants, both within the combat theater and other areas in which our troops operate, must be received and acted upon by VA as early as possible. Up-to-date information on these situations is invaluable to VA's ability to identify Veterans who may have been affected by an exposure, evaluate their individual risk of exposure and for sequelae, provide appropriate medical surveillance, and mitigate untoward health effects that are known to be caused by these toxicants. In addition, where the possible health outcomes are not known, it is important to perform prospective epidemiological studies on exposed troops. This will provide better information than performing retrospective studies once it is determined that adverse health outcomes are being ascribed to a potential exposure.

To this end, the Joint DOD/VA Deployment Health Working Group (DHWG) was established. This working group reports to the Joint Executive Council through the Health Executive Council (HEC). The objective of this group is to identify and foster opportunities for sharing information and resources between VA and DOD in the areas of deployment health surveillance, assessment, follow-up care, health risk communication, and research and development. Each year this working group discusses deployment-related concerns and develops strategies by which to address them. The DHWG meets monthly to discuss a wide-ranging array of exposure issues, including those dating to the World War II era. The DHWG also actively seeks to discuss and recommend coordinated action to identify involved servicemembers, establish a determination of risk for this population, and develop methods of outreach, risk communication and, where necessary, medical surveillance and appropriate health care for Veterans with any condition that may have resulted from these exposures.

Now I will discuss in greater detail the four exposures about which the Committee asked for specific information.

Incinerator at Naval Air Facility Atsugi

Naval Air Facility Atsugi, Japan is located about 25 miles from Tokyo at the site of a Japanese Air Force base which the U.S. took control of in 1945. In 1985, a private waste incinerator, Shinkampo Incinerator Complex (SIC), began operations immediately southeast of the community areas of the base. The incinerator burned a variety of liquid and solid industrial waste, municipal solid waste, and construction debris. The incinerator released a plume of smoke, ash, particulate material, and fumes at ground level over the community area of the base. Complaints by residents regarding air quality led to multiple health risk assessments between 1988 and 1999. These assessments demonstrated health risks related to the incinerator plume which resulted in efforts by representatives of the U.S. Government to close the incinerator. This was accomplished in 2001. It is estimated that over the 15 years of operation, 18,000 adults and 8,000 children could have been exposed, with a typical exposure duration of 3 years.

The non-cancer health effects of primary concern are impairment of respiratory function from exposure to inhaled respiratory toxicants particularly among the resident children at the base. Permanent reduction in respiratory function can occur after several years of exposure to respiratory toxicants especially if exposure oc-

curred before age 16. The final health risk assessment completed in 2002 by DOD noted an increased risk of cancer, above the U.S. background rate, among residents of Naval Air Facility Atsugi during incinerator operations.

In 2007, Battelle Corporation was asked by the Department of the Navy to conduct a review of the various health risk assessments and recommend what, if any, population-based medical surveillance of residents of Naval Air Facility Atsugi might be warranted, as well as the parameters and expected outcomes from such screenings. Battelle published its report in June 2008. The only recommendation from that report was that a health registry be established for residents of Naval Air Facility Atsugi. All medical surveillance recommendations were limited to the juvenile population at the base.

Because all of the recommendations in this detailed report address medical surveillance of a population not within VA's statutory authority, VA has not requested information regarding this cohort. Any Veteran who served at the Naval Air Facility Atsugi who may develop either a respiratory condition or cancer that competent medical authority ascribes to exposure at Naval Air Facility Atsugi would be eligible to submit a claim for direct service connection for the condition, provided they meet other eligibility criteria for benefits. VA will inform regional offices of the Naval Air Facility Atsugi situation and alert them to the possibility of disability claims from Veterans who were stationed there. All such claims will be evaluated on a case-by-case basis with evidentiary weight given to medical examinations and opinions from both private and VA physicians. In all cases, the benefit of doubt will be provided to the Veteran. VA's assessment of issues related to Naval Air Facility Atsugi continues to be coordinated through HEC and the Office of Public Health and Environmental Hazards and we continue to monitor study outcomes that could inform future policy decisions.

Water Contamination at Camp Lejeune

From the 1950s through the mid-1980s, some persons residing or working at the U.S. Marine Corps Base Camp Lejeune were exposed to drinking water contaminated with volatile organic compounds. Two of the eight water treatment facilities supplying water to the base were contaminated with either tricholoroethylene (TCE) or tetrachloroethylene (perchloroethylene, or PCE). The Department of Health and Human Services' Agency for Toxic Substances and Disease Registry (ASTDR) estimated that PCE drinking water levels exceeded current standards from 1957 to 1987 and represented a potential public health hazard. The heavily contaminated wells were shut down in February 1985, but it is estimated that more than one million individuals may have been exposed.

An ATSDR study begun in 2005 is evaluating whether children of mothers who were exposed while pregnant to contaminated drinking water at Camp Lejeune are at an increased risk of spina bifida, anecephaly, cleft lip or cleft palate, and childhood leukemia or non-Hodgkin's lymphoma. The results of this report have not yet been released. In the same year, a panel of independent scientists convened by ATSDR recommended the agency identify cohorts of individuals with potential exposure, including adults who lived or worked on the base and children who lived on the base (including those that may have been exposed while in utero), and conduct a feasibility assessment to address the issues involved in planning future studies at the base.

In October 2008, the Department of the Navy issued a letter to Veterans who were stationed at Camp Lejeune while in military service between 1957 and 1987. This letter informed Veterans that the Navy had established a health registry and encouraged them to participate. Veterans who received the letter from the Navy may visit the following Web sites for the most current updates about Department of Navy actions: http://www.atsdr.cdc.gov/sites/lejeune/index.html or www.marines.mil/clsurvey/index.html. Veterans may also call the Department of Navy toll-free at (877) 261–9782.

VA is providing Veterans with information about this issue and offering contact information and referrals to the Navy registry. In December 2008, VA issued a VA Health Care Fact Sheet on the contamination of the ground water at Camp Lejeune. On June 13, 2009, the National Research Council of the National Academies' Committee on Contaminated Drinking Water at Camp Lejeune released a report that indicated further research will unlikely provide definitive information on whether exposure resulted in adverse health effects. However, the report did find 14 conditions with limited or suggestive evidence of an association with exposure to PCE, TCE, or solvent mixtures. VA is convening a work group to evaluate the National Research Council's report and any other relevant scientific studies. This will contribute significantly to further policy decisions.

VA does not operate a registry for this population and does not have special authority to enroll Veterans or their family members based upon this exposure. Veterans who are a part of this cohort may apply for enrollment if they are otherwise eligible, and are encouraged to discuss any specific concerns they have about this issue with their health care provider. Veterans are also encouraged to file a claim for VA disability compensation for any injury or illness they believe is related to their military service. VA environmental health clinicians can provide these Veterans with information regarding the potential health effects of exposure to volatile organic compounds and VA's WRIISCs are also available as a resource to providers.

VA takes the Camp Lejeune matter very seriously and has informed all regional offices of the situation. Disability claims based on contaminated drinking water exposure at Camp Lejeune will be evaluated on a case-by-case basis with evidentiary weight given to medical examinations and opinions from both private and VA physicians. In all cases, the benefit of doubt will be provided to the Veteran.

Sodium Dichromate at Qarmat Ali Water Treatment Plant

VA has been extremely proactive in its response to this exposure event. As you are aware, there are approximately 600 National Guard troops, primarily from four states (Oregon, South Carolina, West Virginia and Indiana), who may have been exposed to sodium dichromate (a source of hexavalent chromium) while serving at Qarmat Ali outside Basrah, Iraq.

VA is obtaining the names and contact information of National Guard troops present at Qarmat Ali. We are also verifying the numbers of these Veterans who have either enrolled in care or received a Gulf War registry exam. We have already augmented the Gulf War Registry (GWR) to reflect service at Qarmat Ali. The involved Guard Members who have had an initial exam will be recalled to have a complete exposure assessment as well as a more targeted physical exam and ancillary testing to detect indications of health outcomes that may be related to hexavalent chromium. Those who have yet to enroll in the GWR will receive this targeted examination initially. They will also receive a chest radiograph and pulmonary function testing. This evaluation will be repeated periodically (every year for an exam and every 5 years for a chest radiograph). All of this testing can be done within the GWR's existing authority.

Once we have made all the these modifications to the GWR, and have established the appropriate process for the involved VA medical centers, VA will send letters to each servicemember explaining the new process and details regarding how to receive an examination. Because this group of Veterans is relatively small and already identified, and because the health risks of exposure to hexavalent chromium are well established, VA believes this is the best cohort to develop its new program of targeted medical surveillance. VA hopes that experience with this program can be a model for other medical surveillance programs for returning Veterans who may have been exposed to environmental toxicants.

VA has begun analyzing the available list of identifiable servicemembers to determine who has filed claims for disability benefits for any condition potentially related to toxin exposure. It is important to note that this analysis is still ongoing and is primarily focused on, but not limited to, diseases of the skin and respiratory system. On preliminary review, it appears that approximately 25 percent of potentially exposed members have filed claims for such conditions. This assessment takes into consideration all identifiable members of the Guard who have previously filed disability claims for such conditions and who have claims currently pending for such conditions. It also assumes that such claims were filed after exposure and related to exposure. This analysis has the potential to identify Veterans whose claims are based on disabilities resulting from exposure at Qarmat Ali and to provide regional office personnel with relevant historical information to assist with evaluating these claims.

Many of these claims may have been adjudicated prior to VA's learning of potential toxin exposure at Qarmat Ali. Therefore, we are currently working on the best possible methods to educate our field-station employees of the circumstances surrounding this incident, ensure those stations have easy access to all identifiable data on the potential exposure of National Guard members, and determine whether VA must readjudicate any claims that were previously adjudicated without such information.

Burn Pits and Other Environmental Exposures

During a May 14, 2009 Deployment Health Work Group meeting, VA was apprised of 24 potential exposure incidents in OEF/OIF. This included various open burn pits for waste disposal, sulfur fires, non-potable water contamination, exposure to industrial waste, and others. DOD and VA have made significant progress in

sharing information and assessing health risks. VA works diligently to obtain and interpret data from DOD and formulate appropriate responses to better serve combat Veterans.

Exposure to open burn pits for solid waste disposal has created significant concern among Veterans and their families. The most widely publicized of these was the burn pit at Balad Air Base in Iraq. According to a May 2008 report from the U.S. Army Center for Health Promotion and Preventive Medicine (USA CHPPM), the amount of solid waste being burned was estimated at about 2 tons of material per day in the early stages of troop deployment and currently may be as much as several hundred tons per day. This 2008 risk assessment concluded that the overall risk estimate for 12 month exposure was low. It states that the risk for both cancer and non-cancer outcomes did not exceed Environmental Protection Agency guidelines for acceptable risk. Affected troops did report upper respiratory irritation due to burn pits. This outcome was expected. Because of uncertainty related to specific exposures, as well as questions about methodology and estimates, VA officials must rely on objective facts developed on a case-by-case basis. VA understands DOD tested air samples at Balad in 2005, 2006, and 2007. USA CHPPM's May 2008 risk assessment was based on the air samples performed in 2007.

VA anticipates that concerns about potential long-term health effects from exposure to pollutants generated from open pit waste burning used throughout the Iraq and Afghanistan theaters will be an ongoing issue for affected Veterans. VA has learned many lessons from previous conflicts wherein servicemembers were exposed to various toxins on the battlefield. In many of those situations, too much time lapsed between Veterans' exposure to such toxins and an easy path to the many VA benefits they had earned. After VA learned of potential exposure for servicemembers to burn pits, and to help address health concerns of Veterans and their families, VA began initiating a contract with the Institute of Medicine to provide a review of potential long-term health effects from exposure to burn pit pollutants.

In addition to these efforts, VA has started presenting one-day seminars to VA and non-VA providers on many of these exposures. These seminars give information regarding the nature of the exposures, their possible health outcomes, how to perform an exposure assessment for Veterans, appropriate medical surveillance, treatment options, and risk communication.

VA is analyzing data on the number of Veterans from the first Gulf War, the Gulf War Era, and OEF/OIF, who have filed service connection claims for a variety of conditions, including respiratory and skin disabilities. This information will hopefully serve as a valuable tool to help VA observe any early, discernable trends such as increased disability claims for diseases potentially related to toxins. VA is currently exploring the best information to include in communication and how best to deliver such information to field employees responsible for adjudicating disability claims, specifically those related to toxins. This analysis is not yet complete.

CONCLUSION

Mr. Chairman VA understands these issues are very important to you, all the Members of this Committee, and to Veterans and their families. I can assure you VA is equally concerned and committed to working with DOD and other agencies to identify potential hazards, inform Veterans of any risks to their health, develop appropriate responses, and deliver needed care and benefits to Veterans and their families. Only through such cooperation will VA be prepared to deliver the proper health care and disability compensation benefits to those entitled. Sharing this information is important because many factors may contribute to adverse, long-term health effects for servicemembers and Veterans.

Thank you again for the opportunity to testify. My colleagues and I are prepared to address any questions you or the other committee members might have.

RESPONSES TO POST-HEARING QUESTIONS SUBMITTED BY HON. DANIEL K. AKAKA TO MICHAEL PETERSON, DVM, MPH, DRPH, CHIEF CONSULTANT, ENVIRONMENTAL HEALTH, STRATEGIC HEALTHCARE GROUP, VETERANS HEALTH ADMINISTRATION, U.S. DEPARTMENT OF VETERANS AFFAIRS

Question 1. What proactive measures is your Department taking to notify the people on the Marine Corps' online health registry for Camp Lejeune that they may be eligible for VA benefits due to exposures?

Response. VA and DOD have a Data Use Agreement (DUA) that permits VA to obtain the names on the Camp Lejeune, N.C., registry. VA received data from DOD in early March containing registry data as of February 12, 2010. Information in the registry identifies individuals self-reporting by name, address, and telephone num-

ber. The registry also contains a subset of approximately 45,000 names of the approximately 157,000 names in the registry that were identified by the Defense Manpower Data Center (DMDC) as active duty members stationed at Camp Lejeune from 1975 to 1985. (Electronic records at DMDC are available only from 1975 forward) VA is developing recommendations for the Secretary based on the 2009 National Research Council Report. "Contaminated Water Supplies at Camp Lejeune, Assessing Potential Health Effects." The Secretary will consider all available evidence and recommendations in determining the content of any necessary future notification of Veterans.

Question 2. Dr. Robert F. Miller testified concerning veterans who had been exposed to fumes from burn pits and other sources in Iraq. Veterans reporting shortness of breath had normal standard respiratory evaluations including chest x-rays, chest CT scans and pulmonary function testing. None of these routine tests could explain the cause for the soldiers' limitations. When Vanderbilt physicians performed surgical biopsies on 45 of 70 soldiers referred for unexplained shortness of breath on exertion, all except one demonstrated some form of bronchiolitis. Given these findings, what actions should be taken by VHA and VBA, including specialized testing and evaluations, when a veteran claims a disability due to shortness of breath after exposure to environmental toxins?

Response. Any exposed Veteran who complains of shortness of breath, that has persisted or gotten worse since an exposure while in the military, should have a chest radiograph and complete pulmonary functions, including pre-and post bronchodilators and what is known as alveolar diffusion capacity (a lung function test). A high resolution CAT Scan (CT) may also be useful. According to a recent scientific symposium on this issue lung biopsy is only used after other diagnostic modalities have been exhausted. VBA will instruct Regional Office (RO) personnel that special methods must be followed when handling disability claims involving various conditions, including shortness of breath, from Veterans exposed to contaminants associated with hazardous material in Iraq and Afghanistan. VBA will issue this instruction in the form of a training letter, which is currently in concurrence. VA is also in the process of requesting from DOD data containing all known locations of burn pits in Iraq and Afghanistan so that VA can provide such information to all field stations.

The exposure training letter will instruct RO personnel to specify that a medical examiner must conduct any reasonably feasible testing for a wide range of respiratory disabilities, including any form of bronchiolitis that may be the result of toxicants. Results must be provided in the examination report along with a medical opinion as to whether it is; "at least as likely as not" that any diagnosed respiratory system condition is related to such exposure.

Question 3. Will VA be contracting with the Institute of Medicine to study the health effects of exposure to burn pits? If so, what is the timeline for that report?

Response. The contract with the Institute of Medicine was signed on October 29, 2009. The contract will end on April 30, 2011, with a report due on that date.

Question 4. If a recently-separated veteran seeks health care at VA and mentions that he was exposed to a burn pit or sodium dichromate, what happens? Is the result the same if the veteran is more than five years removed from active military service?

Response. Necessary care and/or treatment would be provided to all eligible Veterans claiming exposure to a burn pit or sodium dichromate.

Combat Veterans (within their five years of post discharge) will be enrolled upon application for enrollment/care and are eligible for cost-free hospital and treatment for conditions associated with the theater of operation. VA clinicians have wide latitude in determining if a Veteran's condition is associated with Veteran's combat service and thus, cost-free care. This decision does not require the same rigor or standards used for adjudication of a service-connected claim.

Combat Veterans more than five years removed from their date of discharge from the military/release from active duty must meet the applicable eligibility and enrollment requirements that apply. Under current rules, this means that Veterans without other special eligibility factors whose income places them in Priority Group 8 above the current enrollment income threshold could not be enrolled or treated by VA. In such cases, VA would encourage the Veteran to file a claim for service-connected disability rating. If service-connection were granted, VA would offer enrollment and necessary treatment as required.

If the Veteran served in Iraq (but not Afghanistan) even if they were not otherwise eligible for care they would be eligible for a Gulf War registry exam. Based upon the results of this exam, they would be referred to VBA to file a claim for service connection. Once service connection is established for any condition related to

the exposure, they are eligible for further care. VHA and VBA are working together to establish a process for expedited service connection for these conditions. We anticipate that our model exposure-related assessment within the Gulf War registry will be available in spring 2010. The conditions which will be expedited based upon this exposure have been identified. If the model exposure-related assessment within the Gulf War Registry is ready by spring, then it is feasible that VBA can prepare rating-related training by summer 2010.

The Deployment Health Working Group, a joint DOD/VA work group, has recently begun an effort to establish a permanent agreement between the VA and DOD that will permit the transfer of information from DOD to the VA whenever an exposure incident occurs. The outcome of this effort will be a listing of Soldiers, Sailors, Airmen and Marines exposed in any given incident.

Question 5. What occurs when a veteran claims service-connection for a condition due to exposure to contaminated water at Camp Lejeune?

Response. VA RO personnel were alerted to the Camp Lejeune contaminated water situation in the June 2009 C&P Service Bulletin and instructed to adjudicate each related claim on a case-by-case basis, with the benefit of any doubt provided to the Veteran. All available evidence related to the claim will be obtained. Service connection may be granted if the evidence shows: (1) a current chronic disability, (2) military duty at Camp Lejeune during the period of water contamination (as verified though Official Military Records), and (3) a medical nexus or relationship between the current disability and the service at Camp Lejeune. A statement of this medical nexus may be provided by a competent VHA or private medical examiner.

RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY HON. RICHARD BURR TO MICHAEL PETERSON, DVM, MPH, DRPH, CHIEF CONSULTANT, ENVIRONMENTAL HEALTH, STRATEGIC HEALTHCARE GROUP, VETERANS HEALTH ADMINISTRATION, U.S. DEPARTMENT OF VETERANS AFFAIRS

Question 1. At the hearing, I asked whether VA could create a special enrollment category for Veterans potentially affected by the contaminated drinking water at Camp Lejeune using the Secretary's general authority to provide needed health care to categories of Veterans not specified in the law and the question was to be taken back to VA General Counsel. What is the VA General Counsel's opinion on that question?

Response. VA is required to establish and operate a system of annual patient enrollment, 38 U.S.C. 1705(a). The law requires that VA manage the enrollment of patients in accordance with the priorities set forth in section 1705(a)(1)–(8) but specifically authorizes VA to establish subpriorities within each statutory priority group. In accordance with the law, VA established an enrollment system by regulation in 38 CFR 17.36. The system provides subpriorities within the two lowest priority categories (7 and 8). VA currently enrolls all Veterans in priority 1–7 and the highest subpriorities of priority 8. VA could, in accordance with the regulatory process, revise its enrollment regulations to establish in priority 8 an additional subcategory for Veterans who are potentially affected by the contaminated drinking water at Camp Lejeune.

Question 2. During the hearing, there was confusion about whether VA had, in fact, received from the Marine Corps the registry of names of former Camp Lejeune residents.

A. Has this list been shared with VA? If so, when?

Response. VA and DOD have a Data Use Agreement (DUA) that permits VA to obtain the names on the Camp Lejeune, NC, registry. VA received data from DOD in early March containing registry data as of February 12, 2010. Information in the registry identifies individuals self-reporting by name, address, and telephone number. The registry also contains a subset of approximately 45,000 names of the approximately 157,000 names in the registry that were identified by the Defense Manpower Data Center (DMDC) as active duty members stationed at Camp Lejeune from 1975 to 1985. (Electronic records at DMDC are available only from 1975 forward.)

B. If not, will VA work with the Marine Corps to obtain the registry so that VA can better identify the medical history of those who are already receiving VA health care and proactively outreach to those who are not?

Response. See response to A above.

Question 3. It is my understanding that there is an on-going initiative funded by the Department of Energy (DOE) that provides eligibility to former DOE workers to participate in a program that provides examinations and specialized testing for

health effects that may be related to exposures they encountered during their time as employees or contractors to DOE. In addition, if health effects that could be linked to those exposures are identified, these former employers may be provided health care and the opportunity to file for compensation.

A. Has VA discussed this program with the Department of Energy? If so, what have you learned from those discussions?

Response. Subject matter experts in the Environment Agents Service in the Office of Public Health and Environmental Hazards, Veterans Health Administration are familiar with this program. The Environmental Health Strategic Healthcare Group has discussed this program with the medical director of The Building Trades Program. This program is the basis of the War Related Interactive Online Referral and Surveillance (WARRIORS) program. It is an initiative which is funded by VA's Office of Rural Health and will be utilized to assist rural physicians without access to VA expertise on these issues to perform a conflict/exposure specific evaluation to include history/examination, ancillary testing and recommended follow-up and consultation. The contractor for development of this program is in the process of being approved and an award is expected to be made by the end of FY2010.

B. If no, are there lessons that VA could learn from further examining this DOE program?

Response. See response to A above.

Question 4. At the hearing, a VA representative testified that guidance to the field—in the form of a Fast Letter—would be sent regarding how to handle disability claims from Veterans who were stationed at Camp Lejeune during the period that the water was contaminated.

A. Has that been done? Would you please provide a copy of the Fast Letter when it has been sent out?

Response. VBA will instruct Regional Office (RO) personnel that special methods must be followed when handling disability claims arising from six separate exposure events including the Camp Lejeune contaminated water incident. The other events include burn pits used throughout Iraq, Afghanistan, and the Horn of Africa; high particulate matter levels throughout Iraq, Afghanistan, and the Horn of Africa; the 2003 Iraqi sulfur fire incident; the 2003 sodium dichromate exposure incident at Qarmat Ali, Iraq; and, the Atsugi, Japan incinerator incident. VBA will issue this instruction in the form of a training letter. VA will provide the Committee a copy as soon as it is complete.

The exposure training letter will consist of three elements. The first section will serve as an educational tool on each specific exposure, including the Camp Lejeune incident. The second section contains claims processing instructions that are specific to these exposures. Finally, the third section functions as an additional educational tool that VA adjudicators will use to alert Compensation and Pension (C&P) examiners to a Veteran's specific exposure incident(s) so that any subsequent examinations and/or medical opinions are fully informed.

Through this process, all VBA employees involved in adjudicating claims, and C&P examiners, will become well aware of the details of each of the six exposure incidents, including the water contamination at Camp Lejeune.

B. With respect to the other three exposures discussed at the hearing (Qarmat Ali, burn pits, Atsugi), has any guidance been sent to the field on how to adjudicate claims from potentially exposed veterans? If so, please provide copies of any such guidance and a timeline for when the guidance was provided to the field.

Response. The October 2009 C&P Service Bulletin provided information to RO personnel on the environmental contamination history of Naval Air Facility (NAF) Atsugi, Japan and instructed them to handle any related disability claims on a case-by-case basis, with the benefit of any doubt provided to the Veteran. VBA is currently in the process of developing instructions for the field on methods for handling disability claims based on chromium exposure at Qarmat Ali, Iraq and exposure to the toxic contaminants associated with burn pit sites, as well as others in Iraq and Afghanistan.

The information needed to assess these sites and the contaminants associated with them will require additional research and cooperation from the Department of Defense. VA received the names of National Guard members who were potentially exposed to toxins at Qarmat Ali, Iraq. We are generating requests for information related to additional exposures.

VA also contracted with the Institute of Medicine to investigate the possible health outcomes of exposure to burn-pit emissions. When this research is completed, a Fast Letter and/or training letter will be released to the field. The November 2009 C&P Service Bulletin also provided basic information.

C. If guidance has not been provided to the field with respect to any of these exposures, would you please provided a timeline for when you anticipate providing such guidance?

Response. Guidance on handling Veterans' claims based on exposure at Camp Lejeune and NAF Atsugi has already been provided to the field through the C&P Service Bulletin. When additional research is completed in the next few months, Fast Letters and/or training letters will be released to the field providing information on handling claims based on all known exposure events in Iraq and Afghanistan.

Question 5. At the hearing, we also heard testimony about a sulfur mine in Iraq that was set on fire in 2003. Would you please provide an update on what steps VA has taken to date with regard to that exposure incident?

Response. Please see post-hearing Question 2 from Senator Akaka and VA's subsequent response. VA was made aware of this fire and potential exposures in March 2009. DOD has determined that bronchiolitis in Veterans with known exposure to the 2003 sulfur fire is "plausibly" related to such fire. The subject of the sulfur fire will be covered extensively in VBA's forthcoming training letter on hazardous exposures in Iraq and Afghanistan.

Chairman AKAKA. Thank you very much, Mr. Peterson. The chair calls for a slight recess and we will be right back.

[Recess.]

Chairman AKAKA. The hearing will come to order. And now I call for the testimony of Dr. Postlewaite.

STATEMENT OF R. CRAIG POSTLEWAITE, DVM, M.P.H., ACTING DIRECTOR, FORCE HEALTH PROTECTION AND READINESS PROGRAMS, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (HEALTH AFFAIRS), U.S. DEPARTMENT OF DEFENSE

Mr. POSTLEWAITE. Good afternoon, sir. Thank you very much. Mr. Chairman, distinguished Members of the Committee, thank you for the opportunity to discuss the Department of Defense Occupational Environmental Health Program, our program to assess health risks associated with the environment in our workplaces.

I am Dr. Craig Postlewaite, Acting Director of Force Health Protection and Readiness Programs for the Assistant Secretary of Defense for Health Affairs. I am also a veteran with 26 years active duty service. Under my purview is the policy and oversight for the deployments—or for the department's Deployment Health Program. A key component of the Deployment Health Program is our Occupational and Environmental Health Program, or OEH, as I will refer to it.

Its goal is to protect our personnel from accidental death, injury, or illness caused by hazardous, occupational, or environmental exposures. This includes preventing or minimizing short-term health effects, especially those severe enough to interfere with mission accomplishment and also any long-term effects that may affect our servicemembers' health and quality-of-life in the years to follow.

To prevent or limit hazardous exposures, both in peace time and in deployed settings, the Department applies a rigorous risk management program. Mr. Chairman, the Department's many fine OEH professionals take their responsibility seriously and are fully dedicated to protecting and preserving the health of our personnel by identifying hazards, ascertaining the significance of those health hazards in terms of risk, determining appropriate controls and communicating the risk information to commanders and affected personnel.

Since 2001, our OEH professionals have collected over 17,500 individual environmental samples throughout the U.S. Central Command Theatre of Operations, including nearly 10,000 in Iraq, more than 3,500 in Kuwait and over 3,300 in Afghanistan. In the vast majority of cases, these samples indicate that U.S. personnel are not experiencing any exposures that would put their long-term health at risk.

However, with the current technology and under war time conditions, it is not always possible to monitor the working locations of all servicemembers for all hazards, especially for those who operate outside of our base camps.

While our focus continues to remain on exposure prevention and control, we realize that some hazardous exposures can and will occur despite our best efforts. And unfortunately, some individuals may develop short-term or long-term health effects as a result.

First and foremost, we want to ensure that those affected individuals get the very best care and treatment they are entitled to through the Military Health System and the VA. Second, these fine veterans have our profound sympathies for the pain and suffering they and their families experience. They have earned our sincere gratitude for their service.

Our Department of Defense Instruction, Occupational Environmental Health, DODI 6055.05, requires DOD to share hazard and exposure data with the VA to assist in the adjudication of veterans' disability claims. Such records also are valuable in establishing diagnosis and proper treatment.

To ensure that VA is aware of individual hazardous exposures, all exposure-related information is to be entered into each individual's medical record so it will be available to the VA at time of treatment or claims adjudication.

Once the DOD electronic exposure record becomes a reality—and I discuss that more in my written testimony, hopefully it will be in the next few years—it will also be made available to the VA. For a number of years, the DOD and VA have collaborated through the DOD/VA Deployment Health Working Group, as Dr. Peterson mentioned. We use that forum to share, on a frequent basis, information related to exposures.

While the Department of Defense is in-garrison and deployed, OEH programs have been quite effective in identifying and controlling chemical, biological, and physical hazards which our servicemembers or DOD civilians may encounter. We, of course, are fully committed to improving those programs wherever we can.

Mr. Chairman, thank you for the opportunity to discuss the DOD's OEH program today. I appreciate it.

[The prepared statement of Mr. Postlewaite follows:]

PREPARED STATEMENT OF R. CRAIG POSTLEWAITE, DVM, MPH, ACTING DIRECTOR, FORCE HEALTH PROTECTION AND READINESS PROGRAMS, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (HEALTH AFFAIRS)

Mr. Chairman and distinguished Members of the Committee, thank you for the opportunity to discuss the Department of Defense's (DOD's) Occupational and Environmental Health (OEH) Program.

The OEH program is an important component of the Department's efforts to enhance Force Health Protection. DOD understands the importance of anticipating, recognizing, evaluating, and controlling health hazards associated with exposure to chemical, physical, and biological hazards. Our goal is to protect our personnel from

accidental death, injury, and illness caused by hazardous occupational or environmental exposures. This goal includes preventing and/or minimizing short-term health effects, especially those severe enough to interfere with mission accomplishment and, any long-term effects that may affect a Servicemember's health and quality of life in years to come.

To prevent or limit hazardous exposures, both in peacetime and in deployed settings, the Department applies a rigorous risk management program. Mr. Chairman, the Department's many fine OEH professionals take their responsibilities seriously, and are dedicated to protecting and preserving the health of our personnel by identifying hazards, ascertaining the significance of any health or safety risks associated with the hazards, determining appropriate options to control the hazards, and communicating risk information to commanders and affected personnel.

In the peacetime setting, the policies and procedures governing our OEH program are contained in DOD Instruction (DODI) 6055.05, "Occupational and Environmental Health." Our OEH policies and procedures for the deployed setting are established in three documents: DODI 6055.05; the Joint Staff memorandum, MCM 0028–07, "Procedures for Deployment Health Surveillance"; and DODI 6490.03, "Deployment Health."

Mr. Chairman, in August 2006, the Under Secretary of Defense for Personnel and Readiness issued updated policy guidance for deployment OEH in the revision to DODI 6490.03. This revision significantly strengthened requirements for deployment OEH surveillance, including OEH data reporting and archiving; medical record entries documenting exposures; deployment health risk communications; and established a new requirement to track and report once daily the locations for all deployed Servicemembers so environmental hazards at a particular location could be linked with the individuals who may have been exposed to them during the time those hazards existed.

The deployment OEH program actually begins during our pre-deployment preparation phase, when occupational and environmental hazard assessments for the current theater of operations, and any other theater of operation or deployed location as well, are conducted based on medical intelligence provided by the National Center of Medical Intelligence and other sources. Once in theater, we accomplish baseline, periodic, and incident-driven OEH surveillance by monitoring the air, water, soil, food, and disease-carrying vectors.

Since 2001, we have collected more than 17,500 individual environmental samples throughout the U.S. Central Command Theater of Operations, including nearly 10,000 in Iraq, more than 3,500 in Kuwait, and more than 3,300 in Afghanistan. In the vast majority of cases, these data indicate U.S. personnel are not experiencing any exposures that would put their long-term health at risk. However, with the current technology, it is not possible, in a wartime environment, to monitor the working locations of all Servicemembers for all hazards, especially for those who operate outside of base camps.

While our focus continues to remain on exposure prevention and control, we realize that some exposures can, do, and will occur despite our best efforts. In recognition of that reality, we revised DODI 6490.03 and the Joint Staff memorandum on Deployment Health Surveillance to take steps to effectively address gaps that had hindered the assembly of electronic individual deployed longitudinal exposure records as called for by the President in August 1998 in Presidential Review Directive 5, "A National Obligation, Planning for Health Preparedness for and Readjustment of the Military, Veterans, and Their Families after Future Deployments."

Today, the process of assembling individual longitudinal exposure records is labor intensive, but it can be done with available data. Over the next several years, we anticipate it will be possible to extract the medical record entries of all personnel who have received medical evaluation and care for confirmed exposures and also access an individual Servicemember's assignment history (dates and locations), including their peacetime, in-garrison assignments as well as their recent deployments. Their deployment histories will be used to retrieve archived OEH monitoring data for those deployment locations where exposures may have occurred, or existed, during the time the individual was deployed to that location. By merging deployment environmental monitoring data with the in-garrison occupational monitoring data and adding the medical record entries, we will be able to achieve the vision established by the President.

In addition, the Department will be able to access population-at-risk databases, such as the Personnel Blast and Contaminant Tracking System that records the names and other identifiers of personnel who have been involved in exposure incidents but may not have been affected severely enough to result in medical evaluation or treatment.

Department of Defense Instruction 6055.05, "Occupational and Environmental Health," requires DOD to share hazard and exposure data with the Department of Veterans Affairs (VA) to assist in adjudication of veterans' disability claims. Such records also are valuable in establishing diagnoses and treatment.

To ensure that VA is aware of individual hazardous exposures, all individual exposure-related information is entered into each individual's medical record so it will be available to VA at the time of treatment or claims adjudication. Once electronic individual exposure records become a reality, they will be made available to VA.

For several years, DOD and VA have collaborated through the DOD/VA Deployment Health Working Group, to focus on issues related to the post-deployment health of Servicemembers and veterans. Environmental and occupational exposures are a major focus of the group and discussed at nearly every monthly meeting.

To reduce hazardous exposures or the resulting health impacts from potential exposures to deployed personnel, the Department provides all deploying Servicemembers comprehensive pre-deployment health threat and countermeasures briefings. Additionally, members also complete a pre-deployment health assessment; provide serum samples; and obtain all necessary immunizations, preventive medications, and personal protective equipment they need prior to deployment.

Following deployment, members provide an additional serum sample and complete a post-deployment health assessment within 60 days of return from deployment, followed by a post-deployment health reassessment within 90–180 days. In addition, personnel are referred to healthcare providers as necessary for the evaluation of any self-reported OEH exposures or for other health concerns.

For Operation Enduring Freedom and Operation Iraqi Freedom, we estimate that, on average, approximately four percent of deployed Servicemembers seek care for a non-battle related injury or illness each week. This is the lowest rate of disease and non-battle injuries ever recorded for a large operation in a time of war, and is a reflection, in part, of the effectiveness of Force Health Protection and OEH programs.

Overall, the Department is pleased with both in-garrison/peacetime and deployed OEH programs that have been quite effective in identifying and controlling chemical, biological, and physical hazards. Of course, there is always room for improvement, and we are fully committed to bringing about those improvements.

Mr. Chairman, thank you for the opportunity to discuss the DOD Occupational and Environmental Health Program with you. I would be pleased to answer any questions you may have.

RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY HON. DANIEL K. AKAKA TO CRAIG POSTLEWAITE, DVM, M.P.H., ACTING DIRECTOR, FORCE HEALTH PROTECTION AND READINESS PROGRAMS, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (HEALTH AFFAIRS), U.S. DEPARTMENT OF DEFENSE

Question 1. What is the timeline for replacing burn pits with incinerators? Will all burn pits be closed?

Response. U.S. Central Command (USCENTCOM) environmental operational guidance to its Service components in Iraq and Afghanistan is to eventually replace burn pits with incinerators. USCENTCOM Regulation 200–2 directs that when establishing expeditionary bases, "Develop a burn pit, landfill and/or incinerator operation to dispose of non-reusable solid waste. If a burn pit is used, develop a plan to transition to an incinerator as the camp matures and population increases." The regulation goes on to say, "This will be done as soon as practical after the base is established."

In Iraq, to date, we have procured large commercial incinerators through Military Construction funding (MILCON) projects and, in most cases, turned them over to Logistics Civil Augmentation Program for daily operation. Because the MILCON process is slow, in Afghanistan, we purchased smaller incinerators (below MILCON threshold) through the Joint Acquisition Review Board process. Although procuring smaller units has required us to purchase more units, this process has allowed incinerators to arrive faster. More than 105 incinerators have been purchased or established at bases in both Iraq and Afghanistan, and have either replaced or significantly reduced the need for burn pits. However, to prevent the development and spread of disease carried by flies, rats, and other vermin, we will continue to require burn pits as a healthy and safe means of disposing of solid waste where camps are either immature or do not have the population to support an incinerator. Where feasible, landfill options or local commercial disposal are preferable alternatives to burn pits on U.S. bases but neither of these options are viable in our current operational environment. In Iraq, there are 23 solid waste incineration units in oper-

ation at major camps with two units under construction (these are separate and distinct from a similar number of medical waste incinerators and two units for hazardous waste, also in operation). The burn pit at Joint Base Balad was closed on October 1, 2009. United States Forces will continue to use burn pits at selected locations in Iraq until the final United States withdrawal of forces in 2011. In Afghanistan, there are 82 solid waste incinerators in the works, planned, or contracted for purchase and United States Forces—Army and USCENTCOM are developing requirements for additional incinerators. As a result of the drawdown in Iraq, USCENTCOM will transfer reusable incinerator equipment from Iraq to Afghanistan as it becomes available.

Question 2. The number of servicemembers exposed to burn puts is high. How can health effects be properly monitored given the number affected?

Response. The health of personnel in-theater is monitored at several levels:

- At provider level, as individuals seek medical treatment at our in-theater medical treatment facilities and by medics deployed in the field. When a Servicemember is treated, the provider considers the cause of the illness. When an environmental factor may be responsible that is affecting several individuals, this information is elevated through command channels.
- Individual diagnoses and symptoms are entered into the Servicemember's electronic medical record and sent to the Joint Medical Workstation, where population-based trends at the installation and in the theater can be identified to indicate if a problem requires investigation.
- A health assessment questionnaire is provided (to those who deployed) at the conclusion of deployment and again at 90 to 180 days after returning. This questionnaire offers the Servicemember the opportunity to identify any health concerns or problems experienced, and to identify any occupational or environmental exposure experienced or of concern. These questionnaires are reviewed by medical personnel to identify Servicemembers who warrant further evaluation or medical treatment.
- Health outcome data, including any associated with the inhalation of burn pit smoke, is reviewed by the Armed Force Health Surveillance Center and the Department of Defense Deployment Health Research Center. Both organizations are examining the data closely to determine whether there may be any long-term health effects associated with smoke inhalation. While they have generated some preliminary assessments, it is too early to draw any conclusions until further studies are completed.

We are aware that inhalation of the smoke from burn pits by our Servicemembers is responsible for mild, short-term health effects in some personnel to include red, watery eyes and irritation of the upper respiratory system and, in some cases, a cough. We also believe that, in a small number of people with either increased susceptibility to the smoke (genetic/family history, preexisting medical conditions) or combined burn pit smoke exposure with some other inhalation exposure, such as tobacco smoke, may be affected by more serious long-term health effects. The number of these people is quite small compared to the numbers exposed, so it is difficult to establish statistically solid relationships.

Question 3. The Committee understands that there were four National Guard units—Indiana, West Virginia, Oregon and South Carolina—that were present at Qarmat Ali for a period of time. Please provide chronological data (timeline) on when each unit arrived, for what amount of time the unit was present, and when each unit left. In addition, please provide the approximate amount of personnel each unit had, and how many members of each unit were stationed at Qarmat Ali.

Response. There were no U.S. Army units stationed at the Qarmat Ali water treatment facility. The U.S. Soldiers were based either in Kuwait or Basra, they provided individual protection details to KBR contractors. During the time a unit performed this mission, some soldiers may have been sent repeatedly to the Qarmat Ali facility, while others may have never been sent to the facility.

The exact timelines for the mission support are not available, the approximate dates of the missions were:

> 1st Battalion 162nd Infantry (Oregon Army National Guard)—started the personal security mission in April 2003, when KBR began to conduct site visits and repairs. They continued the mission until replaced by the Indiana Army National Guard in the middle of June. After an overlap with the Indiana ARNG Soldiers, the Oregon ARNG Soldiers moved to new missions at the end of June. The unit supported the mission from Kuwait. Since the actual work began at the site in May, the Oregon ARNG Soldiers supported the mission for approximately six weeks. The Oregon ARNG reported 278 soldiers were involved in this particular mission. In 2003, when the Army conducted site testing and medical evaluations, the unit reported 48 Soldiers having been at the site.

1092nd Engineer Battalion (West Virginia Army National Guard)—From April until July 2003 the unit was assigned the personal protection detail. The WV ARNG was based out of Kuwait and chose to perform the mission by assigning the responsibility to C Company for the entire period of the mission. The WV ARNG period overlapped the Oregon and Indiana ARNG mission change. In 2008, the unit reported having 124 Soldiers involved in the Project RIO mission.

1st Battalion 152nd Infantry (Indiana Army National Guard)- started the personal security mission in June 2003 when they replaced the Oregon ARNG Soldiers. While the unit was based in Kuwait, they chose to perform the mission by assigning it to their C Company for the entire time. The C Company was moved to Basra to be closer to the mission site. The Indiana ARNG Soldiers performed the mission from June 2003 until December 2003. The Indiana ARNG reported 128 Soldiers involved in mission. In 2003, when the Army conducted site testing and medical evaluations, the unit reported 128 Soldiers having been at the site.

133rd Military Police Company (South Carolina Army National Guard)—did not perform the personal protection mission. The SC ARNG had a quick reaction force mission responsibility. Should a unit in the area be engaged or need support, they would call the 133rd and the 133rd would respond with rapid movement and additional firepower. The SC ARNG Soldiers had this mission from August 2003 until December 2003. The SC ARNG reported having 142 Soldiers involved in the mission. In 2003, when the Army conducted site testing and medical evaluations, the unit reported 37 Soldiers having been at the site.

In 2008, during the Army review of the incident, the units reported that soldiers not involved in the mission may have visited the site for a variety of administrative reasons. The ARNG headquarters of each state began a mission to contact each soldier to determine the exact number of soldiers who visited the site at Qarmat Ali between April and October 2003.

Question 4. There have been several references made to correspondence between then-Secretary of Defense Cohen and then-Ambassador Foley regarding the effects of the exposure from the Shinkampo Incineration Complex (SIC) near NAF Atsugi and possible courses of action by the Navy to protect the residents stationed there. Please provide copies of all correspondence between these individuals between 1985 and 2001 regarding NAF Atsugi.

Response. [The Committee had not received the requested information by press time.]

Question 5. The Department of Defense has stated that it is in the process of attaining the Social Security Numbers (SSNs) of soldiers from the four separate units that rotated through Qarmat Ali so that these individuals can be added to a database and their health effects can be analyzed. When do you expect this process to be complete? What will happen once this information is attained—who will it be shared with?

Response. Gathering of information has been more difficult than anticipated and is taking longer than expected. More than 1,100 Servicemembers were deployed to Iraq in the four units. Only about one third of those were known to have been directly involved in the mission that placed them at the Qarmat Ali facility (the site of the incident); the number of Servicemembers who may have had an incidental contact with the site (administrative visit, resupply effort, etc.) is unknown. The Army will count all unit members as potentially exposed until it confirms whether they were at the site. To complete this process, the Army will have to contact each individual. The Army's biggest challenge is to locate and contact those individuals who are no longer serving. Some have moved and not left forwarding contact information, others have not responded to attempts by the Army to contact them. Others are still in the Army, but are now deployed again to Iraq or Afghanistan. The Army continues to work this issue and will not stop until they have confirmed every individual who spent even a single day at the Qarmat Ali site. It is anticipated that there will be an initial transfer of SSNs that will occur by December 15, 2009, with monthly updates thereafter.

The SSNs will be shared with two agencies: the Office of the Assistant Secretary of Defense for Health Affairs (OASD(HA)) and the Department of Veterans Affairs (VA). The VA will use the information to track the Servicemembers through a separate registry that they are establishing for this incident. The individuals will receive an entry level medical evaluation and regular medical evaluations to monitor their health and any issues that may arise from the exposure. The OASD(HA) will determine if any individuals were treated while in theater or after returning, and if any

of those treatments were for conditions that may have been related to sodium dichromate exposure.

Question 6. When will you provide the Department of Veterans' Affairs (VA) the data it has requested from you pertaining to veterans potentially exposed to chemicals at Camp Lejeune, so that VA can better determine care and compensation for these veterans?

Response. The Veterans' Benefits Administration requested access to that data on October 21, 2009. The Deputy Commandant of the Marine Corps for Installations and Logistics will provide access to the requested data for the veterans possibly exposed to chemicals. The Marine Corps has contacted the VA and projects that access will be available in approximately three months (January 2010), depending on privacy act requirements and necessary permissions.

RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY HON. RICHARD BURR TO CRAIG POSTLEWAITE, DVM, MPH, ACTING DIRECTOR, FORCE HEALTH PROTECTION AND READINESS PROGRAMS AND DIRECTOR, FORCE READINESS AND HEALTH ASSURANCE

Question 1. At the hearing, Mr. John Resta indicated that the Department of Defense (DOD) may be moving forward with additional air sampling and studies regarding the potential health effects of burn pits being used in Iraq and Afghanistan.

A. Please provide additional details regarding any ongoing or planned air sampling related to burn pits.

B. Is ongoing sampling being done near the living quarters of Servicemembers in Iraq?

C. Would you please provide a timeline of when additional studies will be initiated and when we can expect the results?

Response. Air sampling for particulate matter is conducted across Iraq and Afghanistan at locations with deployed preventive medicine personnel, which includes most of the larger United States base camps. Sampling for volatile organic compounds is also conducted. A multi-Service group is developing a comprehensive air sampling strategy for United States Central Command, focusing on sites with significant air pollution sources such as burn pits. The group is considering potential air hazards, methods to collect samples in a deployed area, and how such data could be used to better characterize the air and estimate the health risk to deployed Servicemembers. The group's members will travel to six locations in Iraq and Afghanistan in early November 2009 to brief on historical air sampling results, discuss the current situation with medical personnel, and gain further understanding of the exposure situation and concerns. Upon return, they will update the draft strategy and present it to the Joint Environmental Surveillance Work Group Executive Committee in late November 2009 and to the Defense Health Board at the end of November 2009. Sampling is expected to begin by early 2010, assuming operational security conditions allow it.

Air sampling locations are selected by deployed preventive medicine personnel based on their assessments of air hazards and the possible impact on the mission and potentially affected populations. These sampling locations frequently include living areas.

Additional burn pit studies are expected to begin in early 2010. The actual dates may be affected by: equipment purchase and shipping, training, coordination of laboratory assistance, rotation schedules, or the operational situations at the locations of interest. Results are expected three to six months after the completion of field work.

Epidemiologic studies to examine health outcomes that may be associated with smoke exposures have been initiated on behalf of the Armed Force Health Surveillance Center and the DOD Deployment Research Center, with two already completed. Each provided important data, but neither can be considered definitive in terms of whether any long-term health risks are present. A plan for additional studies to be accomplished has been outlined and several additional studies are underway. Some of these are hypothesis-generating studies that may require further studies. At this time, it is not possible to provide a firm date on when a determination can be made regarding the impact of breathing burn pit smoke on the incidence of chronic health conditions, but we should have a better idea by March 2010, when the planned studies are complete.

Question 2. A February 2009 article in Inhalation Toxicology, written by employees from the United States Army Center for Health Promotion and Preventive Medicine, noted that authors of a 2005 journal article had "conducted a survey of 15,000

military personnel deployed to [Operation Enduring Freedom/Operation Iraqi Freedom] and estimated that 69.1% reported experiencing respiratory illnesses, of which 17% required medical care," and that "[t]he frequency of respiratory conditions doubled from a pre-combat period to a period of combat operations in this group."

A. What steps are being taken to ensure that possible respiratory illness is addressed in Post-Deployment Health Assessments?

B. To what extent does the smoke from burn pits potentially contribute to respiratory health problems of deployed Servicemembers?

Response. Post-Deployment Health Assessments that are accomplished within 30 days of returning to the Servicemember's home base or station and have a number of questions pertaining to smoke exposure and respiratory illness that each Servicemember is requested to answer:

- Question #8, ". . . cough lasting more than 3 weeks; trouble breathing more than 3 weeks; chest pain or pressure, and other";
- Question #16, "Are you worried about your health because of exposure to chlorine gas, fog oils (smoke screen), garbage, industrial pollution, JP8 or other fuels, smoke from burning trash or feces, and other?";
- Page 6, Question #10, "Do you have any other concerns about possible exposures or events?"; and
- Question #11 (to be asked by a provider), "Do you currently have any questions or concerns about your health?"

Positive or "yes" answers to these questions are followed up by the healthcare provider to determine if a medical referral is needed, including for respiratory illness.

The increase in respiratory conditions in-theater noted in the article was detected by analyzing the Post-Deployment Self Assessment data. Individuals' self-reporting of symptoms on questionnaires seems to increase from pre- to post-deployment, but the increase is not reflected in more objective measures of health status, namely health care encounters. The Army's Center for Health Promotion and Preventive Medicine has assessed the frequency of post-deployment inpatient and ambulatory care visits for respiratory conditions, and not found them to be associated with deployment (i.e., number of deployments and cumulative time deployed). The Department of Defense recognizes that exposure to burn pits smoke can cause acute, short-term and, (most often) mild respiratory health problems in Servicemembers. These symptoms include red, watery eyes, and mild upper system symptoms, (depending on the degree of smoke exposure) such as coughing and sinus congestion. It is possible that some individuals who have preexisting respiratory conditions may have those conditions aggravated by smoke exposures, or because of special susceptibilities, unique medical histories, or even as a result of combined exposures (such as use of cigarettes or cigars), could develop some type of chronic health effects. What is not known is what health conditions might fall into this category and how frequently such conditions may develop. The studies conducted to date have not demonstrated a significant increase on a population-wide basis in respiratory health outcomes after deployment. Additional epidemiologic studies are underway to identify any associated health conditions and the extent of any risks toward the development of long-term, chronic conditions.

Chairman AKAKA. Thank you very much, Dr. Postlewaite. And now we will receive the testimony of Dr. Gillooly.

STATEMENT OF PAUL B. GILLOOLY, Ph.D., CAPT., MEDICAL SERVICE CORPS, U.S. NAVY (RET.), NAVY/MARINE CORPS PUBLIC HEALTH CENTER

Mr. GILLOOLY. Chairman Akaka, distinguished Members of the Committee, I am Dr. Paul Gillooly, representing Navy Medicine. I am here to discuss Navy Medicine's efforts in evaluating the potential health risks for U.S. Navy personnel and their families living and working at Naval Air Facility Atsugi, Japan, from the operation of the adjacent privately-owned Shinkampo Incineration Complex referred to as the SIC.

It is important to make clear our role in Navy Medicine is to conduct such studies when tasked and to act as advisors to Navy Line Officers, who as risk managers, make the final decisions with re-

gard to implementing new policies or visions to existing policies in response to potential health threats in these situations.

The incinerators were installed first in the early 1980s and burned municipal waste. Navy health concerns first arose around 1985 when the incinerator applied for and was granted a license to burn industrial waste. Navy Medicine's involvement began in 1994 and continued through the closing of the incinerator in 2001.

Following the closure of the incinerator, we completed a comprehensive health risk assessment report in 2002. Navy Medicine conducted or sponsored three human health risk assessments, three epidemiological studies, and a medical screening study, all of which underwent high level external peer review. In addition, we coordinated the execution of a robust health and environmental risk communication plan.

The first two screening health risk assessments conducted in 1994 and 1997 raised concerns for both cancer and non-cancer effects from exposure to the incinerator. In October 1997, the Bureau of Medicine and Surgery was tasked by Commander-in-Chief, U.S. Pacific Fleet to conduct a comprehensive health risk assessment. The most significant results of the comprehensive risk assessment were as follows:

The cancer risk for children under the age of six living on base for a 3-year tour of duty suggested that a child's exposure to contaminants from air and soil could potentially result in an additional lifetime cancer risk of 1.1 per 10,000. The calculated cancer risk for adults living or working on base for a 3- or 6-year tour of duty suggested that an adult's exposure to contaminants from air and soil falls within the EPA's acceptable cancer risk range of 1 in 10,000 to 1 in 1,000,000.

We worked closely with EPA throughout the life of this project, and EPA procedures and guidance were used in the development of the sampling plan, collection of the air quality data, quality assurance audits and procedures, and execution of the entire risk assessment methodology. This is an important point in that due to the absence of equivalent regulatory oversight by the Government of Japan, the U.S. Navy assumed that role. To ensure that equivalent standard of environmental protection we were committed to using the accepted and legal risk assessment methodology of the EPA.

To respond to NAF Atsugi community concerns, Navy Medicine was given permission to conduct three health studies: a children's respiratory health study in 1998; a pregnancy loss or miscarriage study for women at NAF Atsugi, also in 1998; and a retrospective cohort study of disease just completed in 2009.

There were no significant findings in either the children's respiratory study or the pregnancy loss study. The recently completed retrospective cohort study of disease was designed to determine if the incidence of disease associated with exposure to the emissions from the incinerator significantly differ for residents of NAF Atsugi from 1985 to 2001 when compared to a similar population in Yokosuka over that same time period.

The study included over 5,600 active duty and over 11,000 family members at NAF Atsugi former-resident cohort and found a significantly higher risk for dermal complaints, a non-cancer health ef-

fect, in the Atsugi population when compared to the Yokosuka population. No other area of analysis found significant differences in disease and illness incidence or health complaints.

Navy Medicine then requested Battelle Memorial Institute, an external independent private agency, to review all available Navy Atsugi health risk assessment data and make recommendations for possible additional medical screening. Battelle stated: "The conclusion of all previous evaluations are remarkable for their consistency. Residents of NAF Atsugi were exposed to ambient air and soil contaminants due primarily to emissions from the Shinkampo Incinerator Complex that were sufficient to produce an incremental increase in lifetime risk of cancer and increase the risk of respiratory non-cancer effects. However, since the incremental risk was relatively small, it would not be scientifically meaningful to provide broad medical screening for all potential exposed personnel."

In April 1998, at the direction of the Assistant Secretary of the Navy for Manpower and Reserve Affairs, Navy Medicine developed a comprehensive risk communication and health consultation plan. This plan addressed the means for providing information to the community, establish procedures for providing formal risk communication to everyone onboard NAF Atsugi and personnel negotiating orders to Atsugi, and implemented health consultations and documentation describing the potential exposure conditions at NAF Atsugi.

In coordinating with the VA, the primary process followed by DOD and Navy Medicine is to ensure the VA is aware of individual hazards exposures and that the information is entered into the medical records of those affected, so it is available to the VA at the time of treatment or claims adjudication.

This process was initiated for NAF Atsugi base residents beginning around 1995 to 1998 timeframe and continued until the incinerator closed in 2002. In June 2009, following a brief by Navy Medicine, the DOD/VA Deployment Health Working Group agreed the VA would receive a list of all affected active duty personnel stationed at NAF Atsugi from 1985 to 2001. This collection of information will aid in any future outreach or surveillance activities for this population as indicated.

Presently, Navy Medicine, through the Navy and Marine Corps Public Health Center, has developed a Web site that provides all publicly available documents related to NAF Atsugi and a frequently asked questions section as a means of providing information to former Atsugi residents, their health care providers, and the VA. This Web site also has a link allowing any VA medical care provider the opportunity to contact a Navy physician directly for any additional information on health issues related to the NAF Atsugi exposures.

Mr. Chairman, distinguished Members of the Committee, thank you for the opportunity to share with you Navy Medicine's efforts in evaluating exposures from the incinerator at NAF Atsugi.

[The prepared statement of Mr. Gillooly follows:]

PREPARED STATEMENT OF PAUL GILLOOLY, PH.D., CAPTAIN, MEDICAL SERVICES CORPS, U.S. NAVY (RETIRED) NAVY/MARINE CORPS PUBLIC HEALTH CENTER

Chairman Akaka, Senator Burr, distinguished Members of the Committee: I am Dr. Paul Gillooly, representing Navy Medicine, to address Navy Medicine's efforts

in relation to potential health risks for U.S. Navy personnel and their families living and working on Naval Air Facility (NAF) Atsugi, Japan, from the operation of the adjacent, privately owned, Japanese Shinkampo Incineration Complex (SIC).

Navy Medicine conducted or sponsored three human health risk assessments, three epidemiological studies and a medical screening study.

HEALTH RISK ASSESSMENTS

At the request of the Commanding Officer (CO), NAF Atsugi, in 1994, the Navy Environmental Health Center (NEHC) conducted a screening human health risk assessment (HRA) with data collected in July, August and September 1994 by Naval Facilities Engineering Services Center (NFESC). The assessment was considered to be a screening assessment because the air quality data collected by NFESC was not intended for human health risk assessment purposes but for compliance purposes, as it was collected over a limited period of time, of short duration and air was the only medium sampled. Groups of chemicals sampled included Volatile Organic Compounds (VOCs); Polycyclic Aromatic Hydrocarbons (PAHs); Organochlorine pesticides and Polychlorinated Biphenyls (PCB); Dioxins and Furans; and metals and particulates. The screening assessment was released in October 1995 and can be found at http://www-nmcphc.med.navy.mil/downloads/ep/Atsugi/NAF%20ATSUGI%20SCREENING%20RISK%2095%20image.pdf. This screening HRA indicated that the air quality at NAF Atsugi could raise the additional lifetime cancer risk to levels higher than the U.S. Environmental Protection Agency's (USEPA's) acceptable lifetime cancer risk range (i.e., 1 in 10,000 to 1 in 1,000,000 additional cases of cancer) for children (under the age of six) spending a normal three-year tour of duty at NAF Atsugi. This risk assessment is based on the interpretation of the National Contingency Plan 40 CFR Part 300 (2003) Subpart E—Hazardous Substance Response Section 300.430 Remedial Investigation/Feasibility Study (d) Feasibility Study (2)(i)(a)(2). Current EPA regulatory risk assessment procedures estimate cancer risks as additional lifetime incidence. The screening risk assessment also indicated concerns for non-cancer health effects, related to trimethyl benzenes and chromium.

The Commander in Chief, U. S., Pacific Fleet (CINCPACFLT) requested NEHC to conduct another screening HRA with 1997 air quality data collected by Earth Tech under contract to Naval Facilities Engineering Command Pacific. The data was collected to address compliance issues, as a result of the SIC owner's request to the Government of Japan to modify the operating permit to allow for an increase in operating hours and throughput. The second screening HRA supported the first with regard to indicating a similar level of concern for calculated cancer risk and concern for non-cancer health effects in the exposed population. It can be found at http://www.nmcphc.med.navy.mil/downloads/ep/Atsugi/SCREENING%20LEVEL%20AIR_TECHNICAL%20MEMO%20NOV%2098.pdf.

In October 1997, the Bureau of Medicine and Surgery (BUMED) was tasked by Commander in Chief U.S. Pacific Fleet, to conduct a comprehensive HRA. Sampling for the assessment was conducted from March 1998 until July 2000. Eight groups of air pollutants were monitored, including: acid gases; aldehydes and ketones; dioxins; PCBs and pesticides; particulate matter (PM10 and PM2.5) and heavy metals, mercury, VOCs, and semi-volatile organic compounds (SVOCs). In soil, sampling was conducted for metals; pesticides and PCBs; SVOCs; and dioxins. Sampling was conducted to collect representative data that is spatially and temporally distributed over various seasons and various weather and incinerator operating conditions. The results of the comprehensive health risk assessment were as follows: http://www.nmcphc.med.navy.mil/downloads/ep/Atsugi/Complete_Health_Risk_Assessment.PDF.

- The cancer risk for children (under the age of 6) living on base for a 3-year tour of duty suggested that a child's exposure to contaminants from air and soil during a 3-year tour of duty could potentially result in an additional lifetime cancer risk of 1.1 per 10,000.
- The calculated cancer risk for adults living or working on base for a 3 or 6-year tour of duty suggested that an adult's exposure to contaminants from air and soil falls within the cancer risk range of 1 in 10,000 and 1 in 1,000,000.
- Eight groups of air pollutants were monitored, including: acid gases; aldehydes and ketones; dioxins; PCBs and pesticides; particulate matter (PM10 and PM2.5) and heavy metals, mercury, VOCs, and semi-volatile organic compounds (SVOCs). In soil, sampling was conducted for metals; pesticides and PCBs; SVOCs; and dioxins
- Potential adverse non-cancer health effects that may be related to concentrations of chemicals in the air such as irritation of the eyes and upper respiratory system, headaches, and skin rash are short lived and directly related to exposure. Health effects related to some of the individual chemicals that cause respiratory ef-

fects may be reversible when an individual leaves NAF Atsugi. However, there is some concern that repeated long-term exposure to chemicals, in combination with others, might result in long-term, non-cancer health effects.

• Because risk assessments use many assumptions and estimates, the final risk numbers always contain some uncertainty. Because of this, the numbers need to be interpreted with caution. The true risk numbers may be higher or lower; however, they are likely lower because there were many conservative assumptions and estimates used in the risk assessment to be health protective, as it was based on an upper bound risk. In the U.S., risk assessment results similar to those found at NAF Atsugi may, in some contexts, result in additional USEPA regulatory action. Legal and political action initiated by the U. S. Department of Justice eventually resulted in the closure of the Shinkampo Incinerator Complex in 2001.

EPIDEMIOLOGICAL HEALTH STUDIES

To respond to NAF Atsugi community concerns, NEHC conducted three health studies, a Children's Respiratory Health Study (children at Yokosuka, Japan, and those on and off-base at Atsugi), a Pregnancy Loss Study for Women at NAF Atsugi, and a Retrospective Cohort Study of Disease.

Children's Respiratory Study

The Children's Respiratory Study was designed to determine if air pollutants from the Shinkampo incinerator were affecting the respiratory health of children. Between 7 May 1998 and 5 June 1998, 127 fifth and sixth grade children who attended Atsugi or Yokosuka DOD schools volunteers participated in a health study. The study can be found at: http://www-nmcphc.med.navy.mil/downloads/ep/Atsugi/Complete_Health_Risk_Assessment.PDF.

There were two primary goals of this study. The first was to determine if there were differences in respiratory health between children who live or go to school at NAF Atsugi and similar children who live at Yokosuka. The second goal was to identify whether the children who live or go to school at Atsugi have more respiratory symptoms on days when they were exposed to higher levels of pollutants from the SIC.

Given the limits of this study, we were not able to document differences in the respiratory health of children living on or off base at NAF Atsugi versus those at Yokosuka.

Pregnancy Loss Study

The Pregnancy Loss Study, designed to describe the rate of miscarriage at NAF Atsugi and other naval facilities in Japan, was conducted in the summer of 1998. The researchers examined hospital and clinic records for Navy personnel or their dependents who were pregnant and living in Japan at some point between June 1995 and May 1998. Information used to calculate the miscarriage rates came from three different sources, Delivery Logs at Naval Hospital Yokosuka (NHY), Pathology records at NHY and the Prenatal Log at the Atsugi Branch Medical Clinic. The study can be found at: http://www-nmcphc.med.navy.mil/downloads/ep/Atsugi/Complete_Health_Risk_Assessment.PDF.

A total of 1862 pregnancies with known outcomes from NHY (including Atsugi, Yokosuka, Sasebo and Iwakuni) were examined. There were 1701 live births and 130 miscarriages between June 1995 and May 1998. The corresponding miscarriage rate for this period was 7.1%. The rate at NAF Atsugi, determined from review of the prenatal log during the same period, was 8.8%. Statistically, there is no difference between the overall NH Yokosuka rate and the Atsugi rate. This rate was based on the examination of 353 total pregnancies, with 322 live births and 31 miscarriages.

Within study constraints, the results of the study indicated that the risk of miscarriage at NAF Atsugi was comparable to Yokosuka,

Retrospective Cohort Study of Disease

In March 2007, Navy and Marine Corps Public Health Center (NMCPHC), formerly NEHC, was requested by the Navy Bureau of Medicine and Surgery (BUMED) to investigate the long-term health effects that might be associated with exposure to SIC emissions. NMCPHC reviewed the HRA to determine the appropriate diseases to study based on chemicals identified in the environmental sampling results. Target organs and illnesses were selected based on published environmental exposure literature from USEPA and peer reviewed literature. Using this information, the Atsugi Health Study was designed to determine if incidence of disease associated with exposure to the emissions of the SIC significantly differ for residents of NAF Atsugi from 1985 to 2001 when compared to a similar population

over the same time period. The study can be found at: http://www-nmcphc.med.navy.mil/downloads/ep/Atsugi/Complete_Health_Risk_Assessment.PDF.

The study included over 5,600 active duty and over 11,000 family members in NAF Atsugi former-resident cohort. Current medical information was available for 24% of active duty and 28% of dependents compared to 19% and 25% for comparison population. Outcomes were studied for 11 cancer types and non-cancer outcomes for ocular, dermal, and respiratory disorders.

The results of the study found a significantly higher risk for dermal complaints, a non-cancer health effect, in the Atsugi population when compared to the Yokosuka population. No other area of analysis found significant differences in disease and illness incidence or health complaints. None of the types of cancer considered as possible associated with exposure to SIC pollution had significantly different risk ratios between the populations.

Medical Screening Study

Navy Medicine, via the Navy and Marine Corps Public Health Center, requested Battelle Memorial Institute, an external private agency, independent from the Navy, to review the health risk assessment data and make recommendations for possible additional medical screening. Battelle Memorial Institute was requested to answer a specific question with supporting evidence: "For those who lived aboard NAF Atsugi during the time of incinerator operation, what, if any, additional population-based medical screening might be indicated? Provide the medically supported basis for that determination." Furthermore, if additional population-based medical screening is indicated, recommend screening parameters, include the standard used and the expected outcome such screening would have on the population's health.

As background for those not familiar with population-based medical screening, the U.S. Preventive Services Task Force (USPSTF), established in 1984 under the U.S. Department of Health and Human Services, has routinely published recommendations for primary care practitioners on what medical screening or testing should be provided to apparently healthy persons based on age, sex and risk factors for disease. These are general medical screening recommendations that are appropriate for any and all members of the U.S. population that are in the recommended screening group. These provide early detection of diseases ranging from cancer to mental health conditions. The recommendations can be accessed at: http://www.ahrq.gov/clinic/prevenix.htm.

From the Battelle report's Executive Summary: "The conclusion of all previous evaluations are remarkable for their consistency: residents of NAF Atsugi were exposed to ambient air and soil contaminants [based on chemicals analyzed for the 2002 human health risk assessment], due primarily to emissions from the SIC, that were sufficient to produce an incremental increase in lifetime risk of cancer and increase the risk of respiratory non-cancer health effects. However, since the incremental risk was relatively small, it would not be scientifically meaningful to provide broad medical screening for all potentially exposed personnel." Because of the authors' opinion that there is no epidemiologic study protocol, with or without medical testing, capable of detecting the small number of cancers that could possibly have been caused by an environmental exposure from the incinerator against the normal background of cancer incidence in the human population, no additional screening or testing is recommended for disease that is not already evident.

COMMUNICATIONS

Communication with NAF Atsugi Population

In April 1998, at the direction of Assistant Secretary of the Navy for Manpower and Reserve Affairs (ASN(M&RA)), NEHC developed a comprehensive risk communication and health consultation program. This was coordinated with the Bureau of Medicine and Surgery, NAF Atsugi, Branch Medical Clinic Atsugi, Commander Naval Forces Japan, Bureau of Naval Personnel and Commander in Chief, U.S. Pacific Fleet. The plan established procedures for providing formal risk communication to everyone onboard NAF Atsugi and personnel with orders to Atsugi. One-on-one health consultations were conducted for all adults extending for more than six years on station, all adults who had children under the age of six, those with chronic respiratory conditions and pregnant or nursing women. A standard entry was made in medical records that described potential exposure conditions at NAF Atsugi.

The program required that Navy Detailers mention the air quality issue and refer military members to medical and base points of contact for further information. It required overseas medical screeners discuss the health risks and provide a focused health consultation for individuals with orders to NAF Atsugi and a provide a fact sheet addressing potential risks of living and working at NAF Atsugi. A phased ap-

proach was established to inform individuals of potential risks to adults and children living or working at NAF Atsugi.

A Health and Environmental Risk Communication Plan addressed the means for providing information to the community (e.g., base newspaper articles, public availability sessions, fact sheets, web sites, library repositories).

Several different medical record forms were used at NAF Atsugi to respond to concerns from NAF Atsugi military personnel and their families about medical documentation and full disclosure of their potential exposure and possible health effects. All forms were placed in personnel and family permanent health records. Branch Medical Clinic Atsugi, with Bureau of Medicine and Surgery's approval, developed a medical record form that listed the maximum sampling concentrations measured in 1994 for 12 chemicals exceeding USEPA or New York State ambient air quality standards during the air quality study. These chemicals included: sulfur dioxide, nitrogen dioxide, hydrochloric acid, carbon tetrachloride, benzene, dioxins, cadmium, mercury, nickel, chromium, arsenic and respirable particulates. (http://www-nmcphc.med.navy.mil/downloads/ep/Atsugi/Appendix_A_appendices.pdf) Cancer risks were also provided on this form. Beginning 1 March 1996, this form was inserted in medical records of all individuals that requested the documentation.

During health risk communication and consultation at NAF Atsugi, which began in June 1998, a revised form was completed for every individual at NAF Atsugi and those with orders to NAF Atsugi. This new form documented full disclosure of potential exposures and possible health effects, related to environmental conditions, for each military member and family member based upon their medical history. The new form was signed by each adult family member (18 years and older) to acknowledge receipt of risk communication. The sponsor or spouse signed the new form for children under the age of 18. Additionally, all servicemembers and family members over the age of 17 indicated that they received a risk communication briefing by signing an "Administrative Remarks NAVPERS 1070/613 (Rev. 10–81)," commonly referred to as a "Page 13" entry to be retained in their military record. Prior to detachment from NAF Atsugi, another medical form was completed to document arrival and departure dates and locations of residence, schools attended and employment, while assigned to NAF Atsugi.

Communication with the Department of Veterans Affairs (VA)

The primary process followed by the DOD and Navy Medicine to ensure the VA is aware of individual hazardous exposures is to ensure all individual exposure-related information is entered into individual medical records of those affected so it is available to the VA at the time of treatment or claims adjudication. This process was initiated for NAF Atsugi base residents beginning in the 1995–1998 timeframe and continued until the incinerator closed in 2001. Navy Medicine follows the DODI 6055.05, "Occupational and Environmental Health," Paragraph 2.c., "Data Sharing," which requires DOD to share hazard and exposure data with the VA to assist in adjudication of veterans' disability claims. However, there is no specific policy that identifies the conditions or circumstances that require notification to the VA of possibly harmful exposures.

Presently, Navy Medicine, through the Navy and Marine Corps Public Health Center (NMCPHC) has developed a Web site that provides all publicly available documents related to NAF Atsugi and a Frequently Asked Questions (FAQ) section as means of providing information to former Atsugi residents, their health care providers, and the VA. These documents include the two health risk assessments from 1995 and 1998 and the final comprehensive health risk assessment from 2002, which along with other studies and reviews, provides the necessary information from which the VA can adjudicate filed claims from military members stationed at NAF Atsugi. The Web site also has a link allowing any VA medical care provider the opportunity to contact a Navy physician directly for any additional information on health issues related to the NAF Atsugi exposures.

For several years, DOD and VA have collaborated in the DOD/VA Deployment Health Working Group, which focuses on post-deployment health of Servicemembers and veterans. This working group has a major focus on environmental and occupational exposures, and it discusses these issues at nearly every monthly meeting. These issues have specifically included the Atsugi incinerator. In the case of the personnel who were stationed at Atsugi, Japan, the DOD/VA Deployment Health Work group received a briefing on the incinerator-generated exposures in June 2009 by the BUMED Occupational Medicine Program Head.

In June 2009, following a brief by Navy Medicine, the DOD/VA Deployment Health Working Group agreed the VA would receive a list of all affected Active Duty personnel stationed at NAF Atsugi from 1985–2001. These data come to the Navy and Marine Corps Public Health Center from the NAF Atsugi Retrospective Cohort

Study of Disease, a cohort epidemiology investigation that utilized personnel records from the Defense Manpower Data Center to assemble the two cohorts for analysis. There were 5,635 Active Duty servicemembers identified from the Defense Manpower Data Center personnel records as being stationed at NAF Atsugi from 1985–2001. This collection of information will aid in any future outreach or surveillance activities for this population as indicated.

MEDICAL SURVEILLANCE

After the Shinkampo Incinerator Complex shut down in 2001, outreach and health consultation activities centered on the specific environmental health exposures for the NAF Atsugi base population, were discontinued. The final health risk assessment performed by the Navy Environmental Health Center (NEHC), forwarded for release in 2002, did not reveal any major changes in the types of materials that posed risk to base residents nor the potential consequences to their health as determined in the 1995 and 1998 health risk assessments. Excess cancer risk was considered to be one new cancer above baseline per 10,000 individuals who as adults stayed more than 6 years at NAF Atsugi or as child under six years of age stayed longer than 3 years. For perspective, this excess cancer risk is approximately the same for adults who live in Denver as opposed to another city at sea level due to increased exposure to naturally occurring ionizing radiation at the higher altitudes.

Mr. Chairman, distinguished Members of the Committee, thank you for the opportunity to share with you Navy Medicine's efforts in relation to exposures at NAF Atsugi.

RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY DANIEL K. AKAKA TO PAUL B. GILLOOLY, PH.D., CAPT, MEDICAL SERVICES CORPS, U.S. NAVY (RET.), NAVY/MARINE CORPS PUBLIC HEALTH CENTER

Question 1. Please provide the best estimate of the size of the population that was at Atsugi between 1983 and 2001. Of this population, how many were servicemembers and how many were dependents, both adult and children? Please also provide the ages of the children.

Response. Due to past Navy initiatives at paperwork reduction, archive/disposal rules and available storage space, there is limited data available. Review of NAF Atsugi's primary mission reflected no major operational revisions during this time period and therefore the number of personnel on base would have remained fairly constant. Snapshot reviews of Command History, Housing Department files, and School records reflect the estimated population averages and demographics as follows:

Officers Authorized	373
Enlisted Authorized	2,532
U.S. Civilians Authorized (U.S.C.S.)	273
NAFI Assigned	271
Japanese Nationals (Master Labor Contract)	1,298
Dependents on base	1,866
Dependents off base	610
Total servicemembers	2,905
Dependents on/off base	2,476

NAF Atsugi only maintains an Elementary School. Junior and Senior Schools are offsite. School attendance records are not available between the years of 1993–2001. Children ages are not available, but school grades are provided (from which approximate ages can be extrapolated). Based on attendance files from 2006 to 2009 the following average enrollments numbers are:

Pre-School	18
Kindergarten	85
1st Grade	88
2nd	85
3rd	78
4th	66
5th	70
6th	51

Question 2. Is there a study that can be done that will provide more accurate data than those done in the past? What would that look like?

Response. The safety and health of our personnel deployed overseas is our number one priority. Therefore, a comprehensive human health risk assessment was conducted which included accurate and extensive ambient air, indoor air, and soil sampling in areas where our military and civilian members and their families lived, worked, and played.

The June 2002, comprehensive ambient air samples were conducted approximately once every 6 days between April 1998 and June 1999. Five different ambient air locations and seven indoor air locations were sampled. A total of 344 ambient air samples and 67 indoor air samples were collected. During each sampling event, wind speeds and directions were also taken in order to correlate this data with ambient air findings. In March 1998, extensive soil samples were collected across the base.

To ensure that the best science was used in the health risk assessment, Navy Medicine requested that the US Environmental Protection Agency (USEPA) and the National Academies of Science (NAS) review and comment on the draft comprehensive health risk assessment.

USEPA scientists reviewing this health risk assessment generally concurred with the study design, methodologies, and conclusions. The NAS made positive comments regarding their confidence in the sampling techniques, data collected, and meteorological monitoring. Both made recommendations for the final report.

Consequently, Navy Medicine made changes to the draft comprehensive health risk assessment report in response to USEPA and NAS comments and recommendations. The final comprehensive risk assessment report, dated June 2002, includes additional information and revisions in response to their comments and recommendations. The final report includes Navy Medicine responses to comments received from USEPA (Appendix B—51 pages) and the NAS (Appendix C—98 pages), which follows this response. Navy Medicine expended approximately an additional nine months, responding to these recommendations and incorporating changes to the comprehensive health risk assessment, to ensure the best science possible was used in support of our Navy community.

Last, the Agency for Toxic Substances and Disease Registry (ATSDR) reviewed the health risk assessment and provided the following statement: "Based on the level of detail presented in the Navy's assessments and the reviews of those documents, especially those performed by the National Research Council [NAS], we concluded that additional public health assessment activities by ATSDR are not necessary as they would not provide an evaluation that is any more definitive than those that have already been conducted."

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Page 2	Dioxin Levels at NAF Atsugi: As a general comment on the NAF Atsugi facility, the proximity to the Shinkampo Incineration Complex (SIC) has led to soil and air levels of dioxins that are generally considered to be of concern. Specifically, the SIC is only a few hundred meters from where people reside, and in a river valley such that its stacks are essentially at ground level with nearby base residential and school settings. The extensive ambient air monitoring program on the base, which was the basis for the estimation of inhalation impacts in this risk assessment, showed an average dioxin air concentration of 1.57 pg TEQ/m^3 over all sampling dates and sampling locations (TEQ = Toxic EQuivalent concentrations, which is the sum of the dioxin congeners in a mixture weighted by their individual toxicities relative to the most toxic congener, 2,3,7,8-TCDD). Concentrations directly downwind at the nearest air monitor were as high as 100 pg TEQ/m^3. This compares to EPA's national compilation of air monitoring data, done as part of the Dioxin Reassessment, showing air concentrations below 0.10 pg TEQ/m^3 in urban background settings, and below 0.05 pg TEQ/m^3 in rural background settings (where "background settings" are defined as those where there is no immediately identified source impacting the monitoring results). Measurements above 1.00 pg TEQ/m^3 are rare in the United States, even in proximity to an incinerator. Soil concentrations were higher than US background as well, with concentrations in the hundreds of parts per trillion (ppt) TEQ near the SIC and at the edge of the base, to concentrations between 10 and 100 ppt where most of the exposure will occur at NAF Atsugi - at the school and residential settings. In the US, rural concentrations average less than 10 ppt TEQ, and urban concentration are in the range of 20 ppt TEQ. These levels of dioxin in the ambient environment at NAF Atsugi	NEHC's current medical recommendation is not to provide testing of dioxin in blood/breast milk for the following reasons: 1. Dioxin levels in blood/breast milk are not standardized medical tests; They are costly and are still primarily a research tool. Consequently, Dioxin values from testing would vary by method used in testing and by quality control efforts in the laboratory doing the test. 2. There are no medical guidelines for interpreting results in individuals. Consequently, knowing a person has X level of dioxin in their blood is all we would know. In addition, the NAF Atsugi population is of transient nature, which may make it difficult to differentiate prior from current exposures. Appropriate control groups may also be difficult to find. As pointed out by the reviewer, any increases would likely be small and may be difficult to distinguish from the control group(s). Instead the Navy recommendation is not to conduct blood or breast milk testing but rather continue to provide medical counseling and risk communication to base residents regarding the limitations of performing these tests.

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	raise a number of issues for the risk assessment which will be highlighted now, recognizing that these topics recur during the specific comments section: Measured dioxin levels in humans: Noting 1) the substantial outlay of resources on this assessment, 2) the ongoing medical studies reported at the end of the HHRA Summary, and 3) the central impact of dioxins on the risk estimates at NAF Atsugi, it is surprising that serum dioxin levels of NAF Atsugi personnel have not been taken. With persistent toxins such as dioxins, the ultimate measure of exposure is the actual concentration in the body. Measurement of serum dioxin levels in this population, especially if coupled with measurements of matched Navy personnel at other bases in Japan, could answer a number of questions simultaneously, e.g., are dioxin doses in naval personnel stationed in Japan higher than in the US and, most importantly, are dioxin doses experienced by NAF Atsugi staff and families higher than other sites in Japan, or in the United States? It would be important to locate a suitable comparison population in Japan for such a blood sampling, since this would be only way to determine what level of exposure to dioxin at NAF Atsugi can be attributed to the SIC. In performing such measurements, it should also be understood that any increases would likely be small and may be difficult to distinguish from the control group(s).	
Page 2	EPA Dioxin Reassessment: The Draft EPA Dioxin Reassessment is scheduled for release very shortly, and will likely propose increasing the cancer slope factor for dioxin considerably, as well as pointing to a number of non-cancer health risks at levels at or within an order of magnitude of the US background. As the dioxin reassessment will be in draft form for some time, it is recommended that the NAF Atsugi assessments should continue to rely on the previously calculated	The subsection on Dioxin in the Health Evaluation section has been expanded to address the Draft EPA Dioxin Reassessment in the revised NEHC Report.

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	cancer slope factor. However, it is important for the Navy to consider the technical and political implications of the dioxin reassessment in its evaluation of NAF Atsugi.	
Page 3	Dioxin TEQs: There is no indication in the HHRA Summary as to which toxicity equivalence factors were used in the assessment. Page 62 of the Pioneer Assessment references the old EPA -- possibly I-TEF -- values from 1994. The source of these TEFs should be more clearly listed in both reports. Also, the 1994 TEF values are out of date, as most international and revised EPA assessments are adopting the WHO TEF values from 1998. If possible, the assessment should be changed to reflect these newer values, or the use of the older values clearly noted and a brief discussion included describing the [presumed] minimal impact of these changes on the assessment.	The source of the TEF values used for the risk calculations is identified on page 62 of the PIONEER report. These values were obtained from EPA's web-site and are presented in a document titled "The US EPA TEF Values" (http://www.epa.gov/nceawww1/dchem.htm). The 1998 WHO TEF values are proposed in the Draft Dioxin Reassessment (released in June 2000) but have not been adopted by EPA. As recommended by the reviewer, the Dioxin TEQs were recalculated in the revised NEHC report using the latest WHO TEF values from 1998.
Page 3	Dioxin Cancer Slope Factor: The CSF value of 150,000 kg-day/mg for dioxin was cited for both ingestion and inhalation exposures (see Pioneer Assessment Table 4-3). No explanation was given as to how this oral CSF was converted into an inhalation slope factor. Such a conversion would necessitate both route to route extrapolations and absorption assumptions. For instance, is all the inhaled dioxin assumed to be taken into the body (no expiration, full absorption, etc.)? EPA staff were unable to find an explanation of how these values were converted, although assessments typically assume 100% absorption for both pathways and that would be appropriate here as well.	The oral and inhalation slope factors for Dioxin were obtained from EPA's Health Effects Assessment Summary Tables (HEAST Table 3 -- Page 3-33, 1997).
Page 3	HHRA Summary could be tightened, especially its conclusions on the impact of the SIC: Although the HHRA Summary covers a lot of information, it needs to be tightened to enhance readability. The HHRA Summary provides valuable information on outdoor levels,	The NEHC report has been revised to include more specific conclusions regarding the SIC contribution to the air quality and its impact on health risk. In the revised report these conclusions address a list of chemicals statistically associated with the SIC, the 50% increase in cancer and non-

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	indoor measures, models, winds, risks to the GEMB, etc., and yet loses the reader regarding its ultimate message. In order to make sense of the sometimes conflicting results, I was forced to prepare my own summary of results on a separate sheet of paper to try and piece together what was or was not attributable to the SIC. Thus, I would suggest that the HHRA Summary redo the conclusions section to succinctly summarize what is known about risks at the site, which risks are most likely attributable to the SIC, and these levels in comparison to risks to the US population. It is probable that the difficulty in summarizing this information relates to the inherent difficulties in apportioning the risks based on the available data. While both NAF Atsugi documents under review demonstrate admirable efforts by the Navy in trying to apportion these risks accurately, EPA reviewers suggest that the Navy needs to go a little further in tightening the link to the SIC and focusing their conclusions. One suggestion is to look to data on similar incinerators to determine which chemicals are emitted, and to use this information to refine the determination of what constituents are potentially related to the SIC. Clearly, dioxins, metals, and PM_{10} were linked, but some of the other chemicals such as hydrochloric acid would also presumably be linked. On the other hand, a number of EPA reviewers pointed out that some of the measured chemicals would be unlikely to relate to an incinerator, and that the Navy should look to other sources in the valley.	cancer risk downwind from the SIC, air dispersion modeling results and the soil trend analysis, which together are indications that emissions from the SIC have a significant contribution to the air quality at NAF Atsugi. A subsection has been added to compare the SIC with incinerators in the U.S.
Page 4	Further mathematical approaches to apportioning risks to the SIC were also suggested in Matt Lorber's comments, which, rather than re-write, are included verbatim: "Two separate efforts are described in this document to address the	The SIC Contribution to Air Quality subsection has been expanded to include more information on the statistical exercises to correlate air concentrations and percent downwind, and to include a discussion on the estimation of background concentrations as well as uncertainties associated with the Upwind-Downwind analysis approach. Ambient air concentrations

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	contribution of the SIC to exposure and risk. The first includes two statistical exercises, which attempt to correlate air concentrations found in monitors and meteorological conditions, such as % downwind, during the monitoring events. These analyses are summarized on pages 16 and 17 of the Summary document and further discussions are found in the Risk Assessment document. One analysis suggests that the SIC is the primary source for hydrochloric acid, dioxin, lead, cadmium, arsenic, and PM_{10}. The second shows an association between the SIC and arsenic, benzene, cadmium, 2,3,7,8-TCDD TEQ, 1,2,-dichloropropane, lead, and PM_{10}, with possible associations indicated for 1,3-butadiene, acetaldehyde, acetophenone, chloromethane, and dieldren. The second effort is a comparison of risks based on a "downwind" site and an "upwind" site. While individuals don't live at these sites, the air concentrations at the sites are significantly different, and it is justifiably concluded (given % downwind data) that these differences are due to the presence of the SIC. My comments on these approaches are: a) On page 38 of the Summary document, it is noted that, "The only difference between the assumptions used to calculate the risks at both sites was the exposure point concentrations." What was the concentration used - the overall average during the 14-month sampling period, concentration corresponding to an 80% downwind condition or otherwise at that monitor, another concentration? This section should specify what air concentration was used. I do see that there is a "Note" on the bottom of Table 3-3, page 40, that provides this information. There are also discussions in the Risk Assessment [Pioneer Assessment] document, which describe the strategy in more detail. This information should be included and expanded upon in the text of the Summary document.	used to calculate the health risks upwind (Golf Course) and downwind (GEMB) from the SIC were average and RME air concentrations on specific days when concurrently the GEMB was greater than 80% of the time downwind and the Golf Course was less than 4% of the time upwind of the SIC (about 8 days).

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Page 4	b) On page 38 of the Summary document, it is noted that the HI increased most for acrolein, from 15.6 at the upwind location to 63.1 at the downwind location. However, acrolein was not identified in either statistical test as having come from the SIC. Why is this? Is there another source for acrolein at the GEMB? This should be clarified. It is discussed on p. 64-65 of the Summary document. This text should be brought forward.	Three statistical analysis were conducted to determine the chemical contribution of the SIC to overall air quality: (1) standard correlation and linear regression analysis, (2) mixed model analysis and (3) non-parametric analysis. These methods used meteorological data and concentrations measured for COCs at NAF Atsugi (e.g., the cancer and non-cancer risk drivers) to determine if the COCs were associated with SIC operations. Acrolein showed a significant positive correlation at the GEMB site based on the log of the concentration scale, one of the criteria of the mixed model analysis. This was similar to the chemicals that were strongly associated with the SIC. However, the correlation for SIC-on days was virtually identical to SIC-off days. In addition, unlike the chemicals strongly associated with the SIC there was no correlation at the GEMB site based on the concentration scale (another criterion). At three other sites the correlation was greater for SIC off days. Even though the monitoring program was an extensive effort, we do not have as many SIC-off days (13) as we do SIC-on (60), which limits the power of the comparative analysis. It is expected that the SIC is a major contributor to acrolein concentrations; however, the data suggests that there are other sources of acrolein in the area. Automobiles are known for contributing acrolein to the environment. This information has been clarified and brought forward in Section 2.3 SIC Contribution to the Air Quality in the revised NEHC report.
Page 4	c) For this downwind/upwind assessment, the cancer risk at the GEMB (downwind) is driven by dioxin, which explained 45% of the risk. Also, the disparity in risk between the GEMB and golf course (upwind) is driven by dioxin. In the overall risk assessment, as noted above, dioxin makes up only a small part of the overall risk - about 15% of the cancer risk. This obviously makes this exercise less relevant to the question it tries to answer - what is the proportion of the total risk for living at NAF Atsugi that can be attributed to the SIC.	This upwind and downwind risk analysis approach was used for days when the prevailing wind toward the GEMB, the site having the greatest apparent impact from the SIC, was nearly 100% and the wind at an upwind site, the golf course, was approximately 0%, on the same day. In section 4.3 of the Summary report we did state: "The results of that method indicate non-cancer risks downwind of the GEMB are approximately 2 to 4 times higher than risks upwind at the golf course on the same day. The cancer risk is 50% higher at the GEMB than the risk at the golf course." As one of the reviewers suggested, we agree that if we had applied this analysis also to

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	When looking at Table 3-3, page 40 of the Summary document, it becomes clear that the overall carcinogenic exposure is about four times higher at the GEMB as compared to the golf course. If one divides the cancer risk in the shaded area, described as "Potential Incremental Risk Attributable to Emissions from the SIC", with risks at the GEMB "downwind" site, the math suggests that 72% of the total carcinogenic risk calculated for the GEMB is due to the SIC. Unfortunately, because dioxin is driving this result, it cannot be used as a general conclusion for the proportion of overall risk for living at NAF Atsugi that can be attributed to the SIC. *I think this risk assessment very importantly needs to be able to derive a statement like this: "It is estimated that about ????% of the overall cancer risk for living at NAF Atsugi can be attributed to the SIC" and all efforts should be made to figure out if such a statement can be developed.* Obviously, the Navy spent a lot of time thinking about this issue and tried different things. The various approaches are summarized on p.82-83 of the Risk Assessment document. Although its not stated, it is possible that the Navy tried to do something like the downwind/upwind analysis for the Areas of Concern (AOCs) instead of locations not associated with living and schooling (i.e., the GEMB and the golf course). Given the utmost importance of trying to cull out the effects of the SIC from the background effects at the AOCs, I think the Navy should go further than they have. Perhaps they should display results from the several efforts they tried. If an overall qualitative result can be culled from the various efforts, such as, "between 40-70% of the overall, upper bound lifetime cancer risk increment from being at NAF Atsugi appears to be attributed to the SIC", then this might be very helpful for decision makers.	other sites besides the Golf Course and the GEMB we may have been able to arrive to an overall qualitative result regarding the SIC contribution. The analysis indeed provides a good prediction of the contribution on those days, but there were only few days in which these conditions were actually met at these sites. We searched the database for the same type of conditions for the other sites involving areas of concern and found even less instances where these conditions were met simultaneously within the 14 months monitoring period. Without extending the sampling period to collect this type of information for additional sites, the analysis itself would have low power. Since dioxin is strongly associated with the SIC, the percent of cancer risk contribution from dioxin is noticeably the highest downwind (45%). However, on this particular upwind/downwind analysis only 6 out of 15 chemicals showed an increase in downwind cancer risk and 4 out of 11 showed an increase in downwind non-cancer effects. From day to day depending on the feedstock there may be different chemicals being emitted, or the same chemicals at different concentrations which makes it difficult to actually assign a percent contribution from the incinerator on an annual basis. All we can say is that there is definitely a contribution to the risk from the SIC, but we cannot say how much. On an annual average basis, it is difficult to separate background from the SIC. To more clearly focus conclusions on the contribution of the SIC, we added a subsection in the Conclusions section which summarizes our discussion on the SIC Risk Contribution.

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	I actually did some calculations on my own from an early set of air concentration data for dioxins. I looked at air concentrations when the wind was blowing from the North to the South (i.e., away from the base in relation to the SIC rather than toward the base, akin to the 4% condition above) to see whether that might provide a reasonable estimate of the "background" air concentration. I found dioxin air concentrations to be about 0.45 pg TEQ/m^3 for this North-to-South "background" condition. The overall average (calculated for all sampling dates, all wind conditions) for all air monitors for dioxin was 1.57 pg TEQ/m^3. Therefore, perhaps, an overall NAF Atsugi average air concentration for dioxin attributed to the SIC is 1.12 pg TEQ/m^3 (1.57 - 0.45). There are two problems I see with this simple procedure: 1) by not considering a background condition when the wind is blowing from the South to the North may neglect southern sources other than the SIC such that the "true" background dioxin concentration is higher than 0.45 pg TEQ/m^3, or there may be no southern sources other than the SIC such that a more appropriate background concentration could be much lower than 0.45, and 2) an "upwind" condition could simply represent a recycling dioxins that were originally from the SIC anyway. It may be impossible to get a true "background". Another approach might be to monitor at a location several miles away, not near obvious sources. Other air concentration data on dioxins from Japan has similarly shown a background at around 0.40 pg TEQ/m^3. The bottom line is, the capability to make a statement such as the one italicized above is really needed for this risk assessment, if there is some way to do it. I'm sure the Navy realizes this and struggled with this question much longer than I have." Similar comments from other reviewers were evident on the value of	

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	the upwind/downwind comparison, such as that provided in Section 5.4 (p. 82) of the Pioneer Assessment, and on the need to more clearly focus assessment conclusions on the contribution of the SIC. The Pioneer Assessment conclusions in 7.1 (p. 91) were generally considered reasonable and succinct on this point.	
Page 6	Additional background information on the site and health complaints at NAF Atsugi: The Pioneer Assessment Introduction (and in its abridged form in the HHRA Summary) needs to include a brief history of the SIC and NAF relationship. The actual history of the SIC and the evolution of concerns regarding plant emissions would set the stage and provide a rationale for the assessment. Additional information on records of complaints or health impacts at the base would provide the reader with a real world perspective on the problem and an indication of any nuisance, discomfort or frank ill effects that had been reported. This latter point highlights the apparent absence in the current NAF Atsugi reports of any "real" health data on the personnel and families since the plant opened in 1985. Although the population is transient and small by epidemiological standards, there must be quite good medical history data and clinic/hospitalization information (emergency visits - like asthma, admissions, etc.) that could be informative as to the nature of the noncancer impacts.	The Introduction section of the revised NEHC report now includes more information on the history and operation of the SIC and summarizes information on health complaints at the base. While the Navy conducted the comprehensive environmental sampling study at NAF Atsugi, two health studies were conducted to identify certain acute health conditions that either could be associated with exposure to poor air quality or were health conditions that concerned the NAF Atsugi community. One of the studies, the Children's Respiratory Health Effects Study, compares peak respiratory flow between children at Atsugi and Yokosuka. The second, the Pregnancy Outcome Study, compares spontaneous abortion rates between Atsugi residents and residents of other bases in Japan. Additional surveillance on air pollution related morbidity, compares rates of skin conditions and respiratory symptoms seen at the NAF Atsugi Branch Medical Clinic and Naval Hospital Yokosuka. The first two studies presented in separate reports are included, as Appendices D and E, in the revised NEHC report. Naval Base Yokosuka served as the control location for the studies for two specific reasons. First, Yokosuka, which is approximately 25 kilometers from Atsugi, is also located on Japan's Kanto Plain. Its population, climate, and vegetation are similar to that at Atsugi. In addition, other than the highly visible point source of pollution at Atsugi i.e., the Shinkampo Incinerator Complex, sources of air quality degradation are similar. Secondly, Yokosuka is the site of the Navy's primary medical treatment

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		facility in Japan, Naval Hospital Yokosuka, which provides access to several healthcare databases. The study on Respiratory Effects in Children had two primary goals: 1. Identify differences in respiratory symptoms and lung function between children who live or go to school at NAF Atsugi and similar children at Yokosuka. 2. Determine if there were more respiratory symptoms in children who live or go to school at NAF Atsugi on days when they are exposed to higher levels of pollutants from the Shinkampo Incinerator during the four week study period (7 May-5 June 1998). The study focused on children since their health is a major concern of the NAF Atsugi residents. Children's lungs also tend to be more sensitive to the effects of air pollution. Fifth and sixth grade students at Atsugi and Yokosuka DOD Schools participated. One hundred twenty-seven (127) students volunteered for the study. Eighty (80) of the students lived on base at NAF Atsugi, 17 lived off base at NAF Atsugi and 30 lived at Yokosuka. The children's lung function was tested each school day during lunchtime. Children recorded the number of hours spent outdoors as well as respiratory and/or air quality related symptoms such as, trouble breathing, coughing during the day or night, feeling bad, runny nose, cold, headache, and irritated eyes. A daily symptom score was given to each child based on the information recorded. Data from ambient air monitoring at Shirley Lanham School was also collected for PM10, nitrogen dioxide and sulfur dioxide, known to cause respiratory effects. Wind direction and wind speed were also recorded, in an attempt to associate health effects with environmental pollution conditions. The primary findings of this study were:

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		1. There were no differences in the respiratory health of children living on or off base at NAF Atsugi and those at Yokosuka. 2. Children living on base at Atsugi reported more runny noses than the Yokosuka children did. 3. All other reports of symptoms were similar. 4. There was no difference in the reported number of colds between the Atsugi on base and the Yokosuka groups. Children living off base at Atsugi did report more colds. 5. Most of the children in the study group had lung function better than that of the general population in the United States. 6. The wind was blowing toward the school for only a short period of time during the four-week study period. As a result, no clear relationship between wind direction and the levels of gases and dust particles could be identified. The study on Pregnancy Outcomes was conducted because many residents expressed concerns during the November 1997 NAF Atsugi Public Meeting about the health effects the Shinkampo Incinerator may be having on their families regarding miscarriages. Therefore the study was designed to describe the rate of miscarriage, at NAF Atsugi and other naval facilities in Japan. Information for the study was gathered by looking at hospital and clinic records for past pregnancies. This was a retrospective study where only documented miscarriages versus live births were considered. The study population consisted of Navy personnel or their dependents who were pregnant at some point between June 1995 and May 1998 and lived on or near NAF Atsugi or other naval facilities in Japan serviced by Naval Hospital Yokosuka (NHY). Information used to calculate the miscarriage rates came from three different sources, Delivery Logs and Pathology records at NHY and the Prenatal Log at the Atsugi Branch Medical Clinic

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		Data collection took place during the summer of 1998. It included the number of live births and the number of miscarriages. The total number of pregnancies with known outcomes during the study period was 1862. For the purposes of this study, a miscarriage was defined as an unintentional pregnancy loss at up to the 28th week of pregnancy. Multiple births were excluded from the analysis. The miscarriage rate was defined as the number of miscarriages divided by the total number of pregnancies examined (the number of babies born plus the number of miscarriages). The findings of the study were: 1. The overall miscarriage rate for patients with known pregnancies from Atsugi, Yokosuka, Iwakuni and Sasebo between June 1995 and May 1998 was 7.1%. This rate was determined by review of the delivery log and pathology records at NHY. When the Atsugi patients are subtracted, the miscarriage rate for the other areas is 7.8%. 2. Review of the NAF Atsugi Branch Clinic prenatal log, during the same period, indicates a miscarriage rate at NAF Atsugi, of 8.8%. However, the data used in this study came from different sources and contain some different information. Therefore, the miscarriage rate at NAF Atsugi cannot be directly compared to that of the other naval facilities that were part of this study population. 3. The NHY and NAF Atsugi miscarriage rates during the study period were both lower than the documented rate of miscarriage for women in the United States, who know they are pregnant, which is between 10% - 15%. 4. This study was conducted with the limited information that was available in various records. The results suggested that the risk of miscarriage at NAF Atsugi and other naval facilities within Japan are at the low end of the expected risk range described for the population of the United States. The ADS is a medical data management information system. The ADS records and classifies all outpatient visits, including follow-up visits, to

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		Navy medical treatment facilities by the International Classification of Disease (ICD-9) coding system. ICD-9 codes exist for all possible diagnoses made in clinical medicine. NEHC examined data on 39 diagnoses potentially related to air pollution (i.e., asthma, upper respiratory illness (URI), conjunctivitis, etc.) during the study. The population categories used in the study include "Adult Active Duty" and "Adult Civilian" (above eighteen (18) years old) and "Children" (below eighteen (18) years). The continued surveillance of air pollution related morbidity indicated the following: 1. There were no significant differences in air quality related morbidity between the adult populations at Atsugi and Yokosuka during the study period., There were no significant differences in air quality related morbidity between the Child (below 18 years of age) populations at Atsugi and Yokosuka during the study period. 2. There was a peak period of respiratory disease complaints at Atsugi from June –August 1998. This is an artifact of the comprehensive risk communication and health consultation program that was at its height during that period. 3. There was a peak period of respiratory disease complaints at Yokosuka beginning in November 1998 and persisting through January 1999. This represents an outbreak of Japan Type A Influenza during that period. This study, Prospective Analysis of Specific Respiratory Diagnosis Between Atsugi and Yokosuka, is still in progress.
Page 6	Comparative assessment between NAF Atsugi and US environmental levels: One of the most interesting and informative aspects of the NAF Atsugi assessments was the comparison between the ambient and indoor levels measured at the base and those measured in US	We searched the scientific literature for information on ambient and indoor levels measured at other cities in Japan. We found a few references on suspended particulate matter, NO2, SO2, metals and some VOCs. However, since the data collection and analysis methodology cited in these

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	cities. This provides a very valuable reality check on what are otherwise somewhat amorphous exposure numbers. EPA suggests that the Navy further develop these comparisons by including data, where available, from Tokyo and Yokohama. These comparisons could be used to further refine the conclusions regarding health risks at NAF Atsugi, as discussed above. For instance, the comparison of criteria air pollutants indicated that, although NAF Atsugi has elevated levels of ozone, NO_2, PM_{10} and $PM_{2.5}$ (see discussion later on $PM_{2.5}$) compared to the US NAAQS, only the PM_{10} level is higher (by quite some margin) than that experienced in comparable US cities.	references were different from those used at NAF Atsugi, or were not well described, we were not able to develop useful and meaningful comparisons to include in the revised NEHC report.
Page 6	As mentioned above, the dioxin levels in air and soil were also substantially greater than US levels. Both PM_{10} and dioxin are also statistically associated with the SIC (as were Pb, As, and Cd). These findings are reasonably clear evidence that the SIC is contaminating the NAF Atsugi base, as they are both statistically based and logical given our knowledge of incinerator emissions (and photographic evidence!). With this foundation, the association of other pollutants to the SIC can be developed based on general *a priori* knowledge of incinerator emissions, other data collected at NAF Atsugi, and ground-truthed to background levels in the Tokyo/Yokohama region.	Although three statistical analyses were conducted to determine chemicals associated with the SIC, the ability to statistically associate all of the specific chemicals, known to be related to incineration, with SIC operations is limited. Factors such as variable feedstock, variable SIC operating conditions, and different meteorological conditions may have prevented the statistical methods from identifying a greater number of pollutants associated with the SIC. However, the statistical analysis conducted by Radian identified six chemicals likely related to SIC operations. These chemicals were hydrochloric acid, 2,3,7,8 TCDD, lead, cadmium, arsenic, and PM_{10}. The statistical analyses performed by RTI on the top thirty-two chemicals contributing to the risk in the risk assessment indicated that arsenic, benzene, cadmium 2, 3, 7, 8 TCDD TEQ, 1,2-dichloropropane, lead and PM_{10} showed an association with the SIC. Other risk drivers such as 1,3-butadiene, acetaldehyde, acetophenone, chloromethane, and dieldrin showed a possible association with the SIC.
Page 6	Acrolein and Acetaldehyde and the SIC: One problematic issue raised by such a comparison to background levels is with acrolein, the principal chemical contributing to the non-cancer risks. Acrolein was	Three statistical analysis were conducted to determine the chemical contribution of the SIC to overall air quality: (1) standard correlation and linear regression analysis, (2) mixed model analysis and (3) non-parametric

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	not associated statistically with the SIC, was associated with southerly winds coming from the valley, contributed the majority of the pulmonary non-cancer hazard quotient, and yet is reported in the HHRA Summary (p. 77) as being far below comparable levels in the United States. What does this mean? Either the US population is generally exceeding a pulmonary hazard quotient due to acrolein, there is another source of acrolein in the valley, or there is an error somewhere. Any assessment of acrolein will need to clarify these issues, preferably using other data on incinerators to determine if acrolein is usually associated with incinerator emissions (as some EPA staff note that it is, along with acetaldehyde and 1,3,-butadiene[1]), and comparison to background data on Tokyo air levels to determine if this pollutant bears any relationship to the SIC, to the industrial complex nearby, or to Tokyo/Yokohama levels in general.	analysis. These methods used meteorological data and concentrations measured for COCs at NAF Atsugi (e.g., the cancer and non-cancer risk drivers) to determine if the COCs were associated with SIC operations. The correlation and regression approach, analyzed one site and the SIC's condition at a time, basing examination of one site's data on the results of statistical tests from another site. The mixed model analysis, which used a more consolidated approach, dealt with all sites simultaneously and attempted to adjust for day-to-day effects resulting from daily variations in SIC feedstock and other sources' variations. The non-parametric analysis, which utilized virtually all the data, was insensitive to outliers, did not depend on the measurement scales chosen for concentration data and incorporated an adjustment for day-to-day differences. The designations "strongly associated" and "with less confidence" are categories formed by simultaneously considering the results of the analyses and evaluating the degree of evidence of association, based on six statistical criteria that considers the last two methods and uses a weight-of-evidence approach, regarding positive correlations. "No association", means that the chemicals either failed all six criteria, or met only one or were assigned this category for other reasons. "Strongly associated" means that at least 5 of the six criteria were satisfied. "With less confidence" means a possible association indicating that although significant positive correlations were found by the parametric analysis, they were not supported by the mixed model approach. Acrolein was not listed as associated with SIC although this

[1]Please note that, as with dioxin, some IRIS assessments are under review, such as for 1,3-butadiene where the inhalation unit risk factor is expected to change by at least one order of magnitude, possibly to the range of 1.4E-5 to 2.1E-6. This change could substantially reduce risk estimates.

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		compound displayed the most significant downwind increase. Acrolein showed a significant positive correlation at the GEMB site based on the log of the concentration scale, one of the criteria of the mixed model analysis. This was similar to the chemicals that were strongly associated with the SIC. However, the correlation for SIC-on days was virtually identical to SIC-off days. In addition, unlike the chemicals strongly associated wit the SIC there was no correlation at the GEMB site based on the concentration scale (another criterion). At three other sites the correlation was greater for SIC-off days. Even though the monitoring program was an extensive effort, we do not have as many SIC-off days (13) as we do SIC-on (60), which limits the power of the comparative analysis. It is expected that the SIC is a major contributor to acrolein concentrations; however, the data suggests that there may be other sources of acrolein in the area. Automobiles are known for contributing acrolein to the environment.
Page 7	It is also recommended for principal contributing chemicals that the actual primary data used to derive the RfC be examined, and that the highest measured values from the plume be compared with the toxicological data to determine if acute effects could be occurring. For acrolein, for instance, the RfC was developed from a LOAEL for the critical effect of squamous metaplasia and neutrophil infiltration of the nasal epithelium in rats,[2] leading to a human equivalent concentration of 0.02 mg/m^3 and an RfC of 2×10^{-5} mg/m^3. The IRIS file also indicates that, in another study, eye irritation in humans was	The actual primary data used to derive the RfC has been examined, and the highest measured 24-hr concentrations detected at NAF Atsugi compared with the toxicological data to determine if acute effects could be occurring. This comparison has been made in the revised NEHC Summary report.

[2]Kutzman, R.S. (1981) A subchronic inhalation study of Fischer 344 rats exposed to 0, 0.4, 1.4, or 4.0 ppm acrolein. Brookhaven National Laboratory, Upton, NY. National Toxicology Program: Interagency Agreement No. 222-Y01- ES-9-0043.

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	observed during a 40 minute exposure to 0.17 ppm, and a NOAEL for this effect was not established.[3] For comparative purposes, the exposure point concentration for acrolein at the day care center was 0.00036 mg/m^3, with a maximum concentration of 0.001 mg/m^3	
Page 7	Note also needs to be taken that another major contributor to the NAF Atsugi non-cancer risks was acetaldehyde, which was measured at levels comparable to similar US cities. If acetaldehyde is a substantial contributor to non-cancer hazard indices at NAF Atsugi, then it also would contribute to similar risks in US cities and Tokyo, and would be difficult to localize to the SIC. In this event, the comparable or lower ambient pollutant levels for these two chemicals (acrolein, acetaldehyde) compared to US cities makes it more difficult to support the case that living at NAF Atsugi is any worse than a similar assignment in the United States. Such a conclusion further focuses concern on dioxins and PM_{10}, where the elevations and links to the SIC are clearer, tempered by the recognition that a reductionist, chemical-by-chemical approach to breathing in an incinerator plume may not adequately convey the true risk of these mixed exposures.	The statistical analyses performed by the Research Triangle Institute on the top thirty-two chemicals contributing to the risk in the risk assessment did indicate that acetaldehyde showed a possible association with the SIC. Although acetaldehyde levels at NAF Atsugi are comparable to ambient levels in U.S. cities and Appendix A shows that the maximum acetaldehyde concentration observed at NAF Atsugi was 0.28 mg/m^3,(well below the levels that could produce acute health effects) acetaldehyde is a major cancer and non-cancer risk driver at NAF Atsugi. Despite the fact that acrolein was the only chemical found to exceed established acute health effect level at NAF Atsugi, we acknowledge that exposures are not limited to a single chemical, but a mixture of chemicals. Since toxicological and epidemiological studies that form the basis of the toxicity values are based on exposure to a single chemical, research on the effects of exposure to a mixture of chemicals is not available; therefore, when two or more chemicals act on the same organ system, their combined effect should be considered as additive, unless there is evidence to the contrary. Our intent in providing a discussion on acrolein and acetaldehyde and other chemicals individually was to identify potential health effects, especially respiratory effects noted in anecdotal complaints.
Page 8	Elevated indoor levels versus outdoor do not exonerate the SIC: The NAF summary notes that, for the chemicals linked statistically to the	By stating that, for the chemicals linked statistically to the SIC, only for dioxin, lead and cadmium are the outdoor levels greater than indoor, we did

[3]Webber-Tschopp A, Fischer T, Gierer R et al. (1977) Experimental irritating effects of acrolein on man. Int Arch Occup Environ Health (German) cited in ATSDR (1990) Toxicological Profile for Acrolein.

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	SIC, only for dioxin, lead and cadmium are the outdoor levels greater than indoor. The HHRA Summary interprets this to indicate that other internal sources of arsenic, particulate matter and other pollutants are responsible for the elevations found indoor. Although alternative indoor sources may be part of the problem, it is also possible that the accumulation of indoor dust, originating from the outside air, is a contributing factor. This should be made clear in the text, and the indoor elevations should not be over-interpreted as exonerating the SIC, especially if the constituents are clearly those persistent chemicals and metals that are often linked to incineration.	not mean to imply that therefore the sources of arsenic, particulate matter and other pollutants were internal. The text will be clarified by editing the last paragraph in the subsection on Indoor Air as follows: "The higher concentrations of metals found in indoor air at NAF Atsugi (especially cadmium, arsenic and lead which are strongly associated with the SIC) could be due to SIC particulate emissions deposited in soil and tracked indoors via shoes, as well as accumulation of indoor dust, originating from the SIC emissions transported indoors via open windows and doors."
Page 8	HHRA Summary Lacking Exposure Scenario Information: One of the fundamental bases of reporting a risk assessment is to clearly step through the "person-related" scenarios that are being evaluated, whether average exposures or reasonable maximal estimates. These scenarios are based on humans and their relationships to locations, not on the locations, *per se*. The HHRA Summary, however, appears to convey risk information based on the golf course or the GEMB, for instance, which is initially confusing as it implies that these physical sites were at risk from SIC exposures. Recognizing that what was probably meant was exposure to individuals during their presence at these sites, it was then very difficult to determine the scenarios under consideration and the time periods of exposure for determining the risk estimates. The reader's confusion is compounded by HHRA Summary Table 4-3 (p. 62), which posits 24-hour exposure to infants on the golf course or at the ground electronics maintenance building. Fortunately, the Pioneer Assessment did provide tabular and brief written information on the exposure scenarios, and the reader is able to piece together what the HHRA Summary was attempting. EPA's recommendation is that, from the outset, the HHRA Summary describe the relevant exposure scenarios under consideration, possibly	These scenarios are summarized in Table 3-7 Summary of Exposed Populations at NAF Atsugi in Section 3 of the HHRA. Reference to Table 3-7 and the rationale for choosing the receptors, pathways and routes of exposure listed on the table have been added to the text.

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	by incorporating and expanding on text from the Pioneer Assessment.	
	Specific Comments: HHRA Summary	
Page 8	Public Health Summary, page 1 (you may wish to label the pages) Clarity on the objectives and purpose of the risk assessment: The first sentence is slightly misleading and establishes an expectation that is not fully met by the risk assessment. The sentence states that, "The Navy Environmental Health Center (NEHC) directed a comprehensive health risk assessment at Naval Air Facility (NAF) Atsugi, Japan to assess potential health effects associated with exposure to the neighboring Shinkampo Incineration Complex (SIC)." Rather, the primary goal of the health assessment appears to be to evaluate the potential health effects from residing at NAF Atsugi. This is better stated on HHRA Summary p. 41, "Given that the primary objective of the Health Risk Assessment (HRA) is to estimate the potential human health risks of individuals living and working at NAF Atsugi ...". A second and equally important goal was to evaluate how the SIC could contribute to that total risk. Thus, the first sentence here sets an expectation that probably wasn't met, noting the difficulties discussed above in evaluating impacts specific to the SIC. It would be better to rephrase the first sentence to reflect the dual purpose noted further down on the first page.	The objectives have been clarified throughout the revised NEHC Summary report.
Page 9	Public Health Summary, page 1, line 7: Suggest deleting text "whom supported" and substituting ", both of which supported".	The Public Health Summary has been extensively modified in the revised NEHC Summary report.
Page 9	Public Health Summary, page 1, full para 2: As no risk assessment is "accurate," EPA suggests caveating this word, such as "... as accurately as possible."	The Public Health Summary has been extensively modified in the revised NEHC Summary report.
Page 9	Public Health Summary, page 2, overinterpretation of risk assessment	The text has been modified as suggested throughout the revised NEHC

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	results: On many occasions throughout the HHRA Summary (and to a lesser extent in the Pioneer Assessment), the risk assessment over-interprets the 10^{-4} value as a benchmark or bright line. This is not the case, and all of these numerical upper bound estimates must be interpreted in light of risk management considerations, etc. The importance of not making bright lines cannot be emphasized enough. For instance, on page 2 of the Public Health Summary, the middle paragraph begins, "The USEPA cancer risk benchmark.... ." There is no such thing, and all such references need to be re-phrased. The Pioneer Assessment (section 5.0, page 66) has a reasonable summary of the emphasis that should be accorded these values in risk assessment and management decisions (see later comment). Essentially, depending on the relevant legislative background and interpretation of risks, upper bound lifetime cancer risk estimates above 10^{-4} to 10^{-6} have generally been considered to warrant increased regulatory consideration and possible intervention. Similarly, a hazard index of 1 is also not an Agency benchmark. There is enough uncertainty and variability in the procedures such that the strength of conclusions in this paragraph is not warranted, i.e., that the $1.1 * 10^{-4}$ risk is *slightly* higher than this benchmark, and that the benchmark is reached in a finite number of months in children and resident adults. EPA suggests rewriting this paragraph in the following manner: "When the results of a human health cancer risk assessment fall in the range of 10^{-6} to 10^{-4} (which equals 1 in 1,000,000 and 1 in 10,000 additional cancer cases per lifetime, respectively), the US EPA typically considers additional activities, including regulations, to mitigate the risk, particularly if the results are close to or greater than 10^{-4}. The results of this risk assessment suggest that a child's exposure to contaminants from air and soil during a 3-year tour of duty could potentially result in an upper bound lifetime estimate of risk at the 10^{-4} level, but that adults would not likely reach this level,	Summary report.

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	even with two tours of duty (6 years of exposure)." EPA suggests that the Navy adopt this type of language in this paragraph and throughout the risk assessment document. EPA also strongly recommends deleting all mention of a specific number of months until a benchmark is reached. This issue occurs again on page 3 of the public health statement. The first difficulty with calculating 32 months, for instance, is that it creates an expectation of accuracy that is totally unfounded. Second, the calculation implies that this part of a child's or adult's life can be viewed in isolation from the rest of their life, which is not the case. The incremental risks from residing at NAF Atsugi must be added to the rest of one's life experience, and one cannot divorce a risk estimate of ~10^{-4} from other risk experiences occurring at other times and at other places. EPA's suggestion is that 32 months is so close to 36 months that it would be illogical to separate the difference.	
Page 10	Public Health Summary, page 2, second bullet: Add "... as much as..." before the 3.7 additional cancer risks. As the bullet before implies correctly, the risk may be as great as this, but is likely to be less, may be zero, and is certainly not a single point value.	The text has been modified as suggested throughout the revised NEHC Summary report.
Page 10	Public Health Summary, page 2, third bullet: As noted above under the discussion of acrolein, the reliance on the hazard index "benchmark" both overstates the importance of the "benchmark" bright line and obscures some of the concerns about which chemicals contribute to this level and how this differs from levels experienced in the United States.	The text has been modified to specify that an HI of 1 assume that there is a level of exposure below which it is unlikely that even sensitive persons will experience adverse health effects. An HI of 1 should not be considered a bright line, which triggers remedial action, since this level of exposure, called Reference Dose (RfD), includes an uncertainty factor that could be as high as 3,000. An HI greater than 1 indicates some degree of concern and the need for professional judgment to evaluate the concentrations and the potential non-cancer health effects related to the concentration of these

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		chemicals.
Page 10	Public Health Summary, page 2, fourth bullet: The "one air pollutant" is not stated and needs to be. It is probably acrolein. There is an extra comma after "respiratory effects,..." that should not be there.	The text has been edited as suggested.
Page 10	Public Health Summary, page 3, second line under Recommendations: The commas in this sentence seem problematic.	The Public Health Summary has been extensively modified in the revised NEHC Summary report. This sentence has been removed.
Page 10	Public Health Summary, page 3, "2. Source control." More information is needed on what kind of emission controls the SIC has in place already. Later in the document, a series on emission reduction devices are listed as in place at the SIC, including electrostatic precipitators, etc. The recommendations section of this report needs to explain why these current emission control devices are not adequate, and what additional devices are required to reach an adequate level of control, if that is indeed possible. Further, the assessment needs to highlight the eye-witness reports that the SIC bypasses the emission control devices, and to document how such bypasses are recognized by Navy personnel and how often they occur.	The Public Health Summary has been extensively modified in the revised NEHC Summary report. Recommendations have been deleted in the NEHC and Pioneer reports.
Page 10	Page iii, first line: NAAQS usually don't have an extra "s" added.	The text has been edited as suggested.

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Page 10	Page 1, Introduction: This introduction has a lot of grammatical rough spots, and should be tightened up considerably as it is the lead in to the report. e.g., commas and periods on line 2; ", as" needed to be inserted in para 2, line 4; media changed to medium on para 2, line 5; extra spaces on para 2, line 7.	The entire report has been edited.
Page 10	P.4, Shinkampo Incineration Complex: A number of reviewers inquired as to how long the incinerator has been there. This information (e.g., the SIC has been there since 1985) and the timing of Navy concerns and construction activities are outlined in the responses to Navy personnel questions (FAQs, 6/6/98; end HHRA Summary), and could be conveyed in more detail here. As mentioned earlier, this information would also be useful introductory sections of both NAF Atsugi documents.	More specific information on the SIC and its waste management operations have been included in the Introduction on the revised NEHC Summary report.
Page 10	Page 5, line 1: The report talks a lot about the constraints in performing a risk assessment on foreign territory. This is understandable regarding the inability to enforce Japanese laws and require inspections of the SIC facility. However, the constraints are harder to understand when looking at air monitoring sites. The assessment needs to more clearly explain why it was necessary for all monitoring sites to be on base, and why the Navy could not rent some space in an upwind location from the SIC. This may be a simple foreign military installation policy issue, but this needs to be stated.	It was necessary to locate air monitoring sites on base, because we could not guarantee the security of air monitoring stations off base. In addition, off base monitoring would greatly increase personnel resources requirements and political implications. These reasons have been added to the text in the revised NEHC report,
Page 11	Page 5, line 5: Delete "all the way", as this emotive form of statement is not consistent with a technical risk assessment report.	The entire sentence has been deleted.

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Page 11	Page 14 $PM_{2.5}$ standard: The $PM_{2.5}$ standard is under litigation, with Supreme Court review under consideration at the time of writing these comments. Thus, the U.S. Government's ability to enforce this standard at the present time is problematic and this needs to be noted in the report.	The text has been edited as suggested.
Page 11	Page 15, last paragraph on Risk Based Concentrations: This paragraph references and commences a strong reliance on the USEPA Region III Risk Based Concentrations (RBCs). The formulae, assumptions and caveats that go into the derivation of the RBCs needs to be more clearly outlined. Also, the Region III recommendations do not necessarily constitute US EPA policy. This limitation needs to be more clearly highlighted in the report, with reference to the Region III values being used only as a form of guidance.	Additional information on the assumptions and caveats that go into the derivation of the RBCs has been included in the report. The text has been edited as suggested.
Page 11	P. 16, Meteorological Monitoring: This paragraph states that other monitoring sites measured wind speed and direction but may not have been as robust as the criteria site. Nevertheless, given the importance of wind direction to the analysis, there should be some discussion of the wind data provided by these other sites. Micro-meteorological effects, including building impacts and terrain elevation gradients, can impact local flow and the wind roses from the other sites should be included to either verify the 10-meter tower data or provide a better picture of the local wind flow.	A discussion of the wind data provided by these other sites as compared to the 10-meter tower data has been included in the report.
Page 11	Page 18, table 2-2: The column under U.S. Data reports the number 44.2 ppm for carbon monoxide. What is U.S. Data in this context? Average levels? Standards? More importantly, why is the "U.S.	The column under U.S. Data has been deleted.

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	Data" higher for carbon monoxide than for any individual city, and higher than the NAAQS? Is there are typo here?	
Page 11	Page 27, first paragraph: This is not a new paragraph, but a continuation of the preceding.	Correction has been made in the text.
Page 11	Page 27, second paragraph: What is the foundation for the assumption that combustion products are found in particles greater than 5 μm? I thought combustion products were in the fine fraction of PM_{10}, and that the more coarse fraction related to physical processes. Also, this sentence is missing a comma.	Since no combustion particles were found in the fine fraction (5 μm), it would be logical to try to identify them in a coarser fraction of PM10.
Page 11	Page 27, Further discussions and the use of air dispersion modeling: The discussion on this topic on p. 27 of the HHRA Summary is too brief. It should at least elaborate a bit on the modeling strategy - that the model back-calculated emission rates based on a calibration exercise where predictions of air concentrations were forced to match observations of air concentrations, as closely as possible. It is also unclear what role the dispersion modeling played in the risk assessment. The text indicates that the modeling was used to evaluate risk at areas without monitors, but it is unclear how this was done. The modeling could have been used to evaluate a worst-case risk scenario by using the maximum value predicted by the model, although admittedly this is complicated by the lack of real emissions data. Also, the modeling concentrations at the monitoring sites could have been compared with the ambient monitored values. If the comparison was favorable, it would have added credibility to using the model more extensively as a tool to evaluate risk and potential mitigation strategies. The fact that this modeling exercise generated emission rates also	Further discussions on the air dispersion modeling strategy and its results regarding predicted concentrations has been included in the revised report. The results were not used in the risk assessment, but rather to predict the average ground-level concentrations from the unit emission rate modeling of the six chemicals associated with the SIC as a contour plot to determine modeled impacts at specific NAF Atsugi locations. Comparison of concentrations of these chemicals with the EPA Region III RBCs was used to evaluate the relative long-term health risk impacts at locations across the NAF Atsugi Base. EPA's suggestion for bolstering Navy's argument that the SIC is contributing far more dioxin to the immediate environment than it is warranted based on its operating practice (i.e. amount burned), at least compared to US incinerators is very logical. However, it doesn't seriously consider the uncertainty with the resulting calculations and also how the information will be used (i.e., would we recommend that someone make a risk management decision based on the modeling data over the empirical data). It would be very difficult to accurately estimate the actual SIC emission concentrations and waste burning rate because of lack of stack

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	presents an opportunity for the Navy to make some important statements in support of a policy advocating emission reductions at SIC. In a previous comment sent by Matt Lorber to the Navy, he commented that: "Preliminary findings are as follows: the annual emissions of dioxins, as backcalculated from the air dispersion modeling exercise, are reasonably low and not out of the ordinary for US incinerators; however, the 30 tons per day waste burning rate is very low so that the emission factor - that is, the grams dioxin emitted per kg waste burned, is very high - much higher than any US category of incinerator." The Navy should pursue determining a dioxin emission factor for the SIC. This way they could bolster their argument that the SIC is contributing far more dioxin to the immediate environment than it is warranted based on its operating practice (i.e. amount burned), at least compared to US incinerators. EPA can supply the Navy with emission factors that have been determined for US incinerators for comparison purposes. If the Navy has a sense of the volume of air emitted, they could also estimate emission concentrations, which can be compared with EPA regulatory limits and to the limits adopted as Japanese standards.	emissions data; modeling uncertainty that include unknown SIC operation and waste composition, variable emission rates, establishment of background air concentrations, emissions from other SIC sources; and the accuracy of ISCST3 in simulating dispersion of SIC plumes. Associated magnitudes of error are likely quite high but are difficult to estimate without more detailed information concerning SIC operation. Therefore it would be also difficult to evaluate the worst case scenarios based on maximum concentration due to the lack of real emissions data. The uncertainty associated with the modeling inputs outweighs the benefits of performing more analysis. We could certainly calculate the amount of dioxin emitted in g/ton of throughput. This information could be compared with incinerators in the United States. However, there is a great deal of uncertainty in this calculation because we don't know: 1) Although they are permitted for 90 tons/day we don't know how much waste is actually burned per day because visual observations of waste truck loads indicate that higher throughputs. The average value could be anywhere along that spectrum. 2. The emission rate. Ours is based on a back calculation from the ambient air samples. This is highly uncertain.
Page 12	Page 29, soil trend analysis: The statement on p. 29 of the HHRA Summary document, "A definite footprint of dioxin deposition associated with air emissions from the SIC is evident in the way the congeners are distributed and their decreasing concentrations with increasing distance from the incinerator" is not quite true (or misleading). Actually, the congener distribution, or as we call it, the congener profile, is similar to the profile of dioxins in US background	Correction has been made in the text which will read: "A definite footprint of dioxin deposition associated with air emissions from the SIC is evident from high concentrations near the SIC with decreasing concentrations associated with increasing distance from the incinerator.

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	settings (with one exception, the soil sample most elevated to the east of the SIC and suspected of being caused by blowing ash or another source), and similar to the profile we saw on a study of the impacts from a US incinerator emitting large amounts of dioxin. The "footprint" really just applies to finding high concentrations near the incinerator, with decreasing concentrations associated with increasing distance from the SIC. There is no unique congener distribution associated with the soil concentrations at NAF Atsugi.	
Page 12	Page 29, end second paragraph: What is an SVOC? Semi volatile organic compound?	Correct.
Page 12	Page 35, end line 10: insert "of" between "most the".	This section of the NEHC report has been extensively revised and the sentence where correction is suggested has been deleted.
Page 13	Page 35, para 2, end first line: insert "and" between "years 6".	This section of the NEHC report has been extensively revised and the sentence where correction is suggested has been deleted.
Page 13	Page 35 - 38, Exposure Scenarios: As noted in the general comments above, there is absolutely no explanation of the exposure scenarios considered in the HHRA Summary text or in the tables. This is the fundamental basis of the risk assessment and is a major oversight. Included in this explanation needs to be information on how the average exposure is distinguished from the reasonable maximum exposure.	These scenarios are summarized in Table 3-1 Summary of Exposed Populations at NAF Atsugi in Section 3 of the HHRA. This section of the NEHC report has been extensively revised to include additional information on exposure scenarios. Reference to the table and the rationale for choosing the receptors, pathways and routes of exposure listed on the table has been added to the text.
Page 13	Review of the Pioneer Assessment indicates that the "residential exposures" are, in fact, all-encompassing exposures including 24 hours/day, 350 days/year. The air and soil concentrations are specific to those locations, but the concentrations used are really not that different from other nearby locations where exposures were	The independence of the various scenarios has been emphasized in the text of the revised NEHC report.

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	considered (school, daycare). The school exposures are 180 day/yr, 8 hr/day exposures, and the daycare are similarly 185 day/yr, 8 hr/day. One might initially think that to get a "total" cancer risk, one should add the risks for residential + school, for example. They might presume that a residential scenario only includes 16 hr/day. Adding residential plus school cancer risks for children is obviously not valid for this assessment. An appropriate way to explain the strategy behind the construction of the exposure scenarios is that they assumed: 1) for the residential scenarios, the contamination exists only at the home and not elsewhere, and the strategy is to be conservative with that environment (350 days/yr, 24 hrs/day), 2) for the school scenarios, the contamination exists only at the school and not elsewhere, and again the strategy is to be conservative for that environment (185 days/yr, 8 hr/day), and 3) for the worker or golfer scenarios, the exposure occurs only at the workplace (250 days/yr, 10 hrs/day) or on the golf course (37 days/yr, 5 hr/day) and not elsewhere. The discussions need to emphasize the independence of the various scenarios so that others are not tempted to add cancer risks, as several EPA reviewers were.	
Page 13	Page 37, Table 3-2: The #1 footnote is difficult to understand, and there is no footnote for #2.	Table 3-2 (Table 3-8 in the NEHC revised report) has been corrected. Footnote #1 has been assigned to the Hazard Index and Cancer Risk column headings only. Footnotes on items on the Scenario column have been deleted, including footnote #2.
Page 13	Page 38, non-carcinogenic hazard index: The HHRA Summary presents Hazard Indices, which are calculated as the sum of all Hazard Quotients calculated for all chemicals/pathways/target organs or effects. This is not fully appropriate, as hazard quotients can be summed for different chemicals and different pathways only if the	The text has been edited to reflect suggested corrections. Table 5-4, page 75, of the Pioneer Assessment which lists all the HIs organized by receptor and target organ/target effect has been added to the HHRA Summary report. The heading on the subsection Non-Carcinogenic Risks has been corrected to Non-Carcinogenic Effects.

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	target organ/target effect is the same. Most of the non-cancer hazard index, about 70%, is attributed to respiratory effects. Table 5-4, page 75, of the Pioneer Assessment lists all the HIs organized by receptor and target organ/target effect. To be correct, the HHRA Summary may wish to report only the HIs associated with respiratory effects, with text stating that several other HIs were developed for other effects such as neurotoxicity, liver, kidney, and other organs/effects, but that respiratory effects would comprise 70% of the total if all were added up. Note, too, that the hazard index is not a measure of risk, but a measure of a level below which no significant adverse effects are likely to occur. Risk, to the contrary, has a stochastic probability to it.	
Page 13	Page 40, table 3-3, 6 year old exposures: This table is quite confusing as it posits scenarios that just cannot be realistic. For instance, how can a child (0 - 6) undergoing a residential exposure scenario get exposed to SIC emissions at the Ground Electronics Maintenance Building, presumably a secure area for Navy personnel only. Another scenario appears to posit that these infants and children are now playing golf.	Table 3-3 presents a Comparison of Downwind versus Upwind Risks at NAF Atsugi. The purpose for this comparison was to estimate the potential impact of emissions from the SIC on the risk. We did not intend to present the risk for a child (0-6) at the golf course or at the GEMB, but to show the impact of the SIC on the risks, on the different scenarios.
Page 14	P. 46, over-interpretation issues: There are a number of smaller text issues on this page that require clarification. With regard to page 46, line 2, EPA does not use the term safety factors, but uses the term "uncertainty" factor. These uncertainty factors generally range from 10 - 1000, but may be 0 or may be up to 3000. In the second last paragraph, there are some caveats that should be inserted, such as "and the number could be as low as zero" at the end of the third sentence. The last line again overemphasizes the bright line nature of the "benchmark of 1 in 10,000."	The text on Section 4, Health Risk Evaluation of the NEHC report has been reorganized. Uncertainty in the risk assessment, including uncertainty in the toxicity assessment, is now discussed in more detail in Section 3, Human Health Risk Assessment Results where the text has been revised based on reviewers' comments.

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Page 14	Page 47, second paragraph: Change "children that reside" to "children who reside". Change vice to versus.	The text has been edited as suggested.
Page 14	Page 53, table 4.1, notes: The mention of different site specific scenarios for the AOCs just re-emphasizes the absolute need for more explanation of these scenarios.	These scenarios are summarized in Table 3-1 Summary of Exposed Populations at NAF Atsugi in Section 3 of the HHRA. This section of the NEHC report has been revised to include additional information on exposure scenarios. Reference to the table and the rationale for choosing the receptors, pathways and routes of exposure listed on the table has been added to the text.
Page 14	Page 53, text: The hazard index greater than 1 indicates an "increasing" risk for developing a non-cancer effect. "Increasing" needs to be inserted	The text has been edited as suggested
Page 14	Page 54, para 1: The attempt to explain the Congressional Commission findings leaves the reader totally confused. Can this be re-written? Also, there really is no typical uncertainty factor in going from a NOAEL to an RfC or RfD, with the usual range going from about 30 to 1000 fold (mode of 100), but they are certainly not usually one thousand fold and are coming down quite markedly as the science improves. We would also voice a concern regarding the reported conclusion of the Commission report that it is OK to use a hazard index of 10 as a benchmark. The basis and context for this statement should be checked, noting that uncertainty factors are currently being peeled off as the science improves, and that the HI value of 1 is appearing, as it should, as based increasingly more on science than policy, albeit with a ways to go.	This paragraph was written to provide another perspective on the non-cancer risk evaluation. For clarification purposes the following has been replaced with the current paragraph: "The Presidential/Congressional Commission on Risk Management and Risk Assessment evaluated the EPA risk assessment approach for assessing hazardous air pollutant sources to implement section 112 of the Clean Air Act. Since the 1990 amendments do not set a threshold for considering health risks other than cancer, the Commission has set a HI threshold of 10 in a screening risk assessment for identifying high priority source categories when determining and managing risk. They chose a threshold index of 10, instead of 1 because there are few hazardous air pollutants with inhalation RfCs that are within a factor of 10 of their NOAELs. Typically, RFCs are one-thousandth of a NOAEL, so a hazard index of 10 in these cases would still leave a margin of exposure of 100."
Page 14	Page 55, last sentence. Change vice to versus.	The text has been edited as suggested.

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Page 14	Page 61, table 4-2: The title of this table needs to be changed to "Percentage Contribution by COCs to the Hazard Indices at Each Location."	The text has been edited as suggested.
Page 14	Page 62, table 4-3: The exposure scenario issue is further confused by this section – the first time that scenarios are mentioned in the report – which then posits 24-hours at each site.	These scenarios are summarized in Table 3-1 Summary of Exposed Populations at NAF Atsugi in Section 3 of the HHRA. Reference to the table and the rationale for choosing the receptors, pathways and routes of exposure listed on the table has been added to the text. Because there is a myriad of exposure scenarios not covered in this investigation, the purpose of Table 4-3 is to illustrate the plausible upper bound inhalation risks for individuals that routinely spend 24 hours a day at NAF Atsugi.
Page 14	P. 63 para 1 line 1: Change vice to versus	The text has been edited as suggested.
Page 14	P. 64 - first paragraph: This paragraph discusses an approach used to assess the SIC contribution to risk by comparing upwind and downwind monitoring sites. As noted under the general discussion above, EPA reviewers encourage the Navy to continue to pursue this strategy. The technique compared the downwind GEMB site on days when the wind was nearly 100% impacting the monitor and days when the upwind golf course site was impacted nearly 0% of the time. As the HHRA Summary states, this type of sustained wind flow over an entire day would not occur very often. Therefore, the number of days available for use in the analysis is limited. An alternative that may allow more days to be used, yet still provide meaningful information on the SIC contribution, would be to consider days where the GEMB site is impacted at least a significant part of the day (e.g., 50%). The prevailing wind flow is essentially bi-directional (i.e., 75% of the time either northerly or southerly, likely due to sea/land breeze interaction). The golf course site is directly east of the SIC	To be confident in the incremental risks that could potentially be attributed to emissions from the SIC the upwind-downwind analysis requires that these directly opposite conditions (>80 downwind and <4% upwind) be observed simultaneously. This simultaneous condition cannot occur when percentage downwind is much lower than 80% at the downwind site and much greater than 4% at the upwind site. The prevalent winds at NAF Atsugi are northerly or southerly, alternating during summer and winter seasons. The GEMB is the only site located directly north of the SIC with no obstructions, being the most impacted site. This facilitates the upwind-downwind analysis because they are located in the path of the most prevalent wind patterns. The analysis we conducted did include ambient air data using > 75% downwind condition at the downwind site which demonstrated the impact due to the SIC. Since the elementary school and the residential towers are not located in the path of the prevalent winds, the wind would still have to blow from the SIC toward the sites for which we have ambient air data (for example easterly or southerly).

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	stack and will be an "upwind site" most of the time. Therefore, even if the GEMB downwind site is only "downwind" for 50% of the time, the difference between the GEMB and the golf course daily concentrations could still be attributed to the SIC as long as the golf course site remained unimpacted. During wind flows from the north or east, both the GEMB and golf course site would be monitoring essentially the same background. Another consideration is to consider other sites as background depending on wind direction. For example, when the wind is from the south and switches to westerly during a 24-hour period, the school site may be a more appropriate background site. The modeling output in Figure 2-2 also suggests that, based on long-term impacts, the school site is the least impacted by SIC.	
Page 15	Page 65, line 5: The term "one and one-half orders of magnitude" is difficult to grasp. What is one and one-half orders of magnitude? 10E1.5 equals 31.6 times, or is this term meant to imply 50 or so?	An increase of one and a one half orders of magnitude means a 15-fold increase in cancer risk between the cancer risk values for the golf course and the GEMB, i.e., from 1.16E-05 to 1.62E-04.
Page 15	Page 66, acrolein exceeding acute health criterion: It is difficult to fully grasp the totality of breathing in an incinerator plume using a chemical-by-chemical approach that relies on reference concentrations and uncertainty factors. Regarding acute effects, the HHRA Summary indicates that only acrolein exceeds acute standards. A more complete approach would then analyze these data by researching the basis for the acrolein acute level and compare this level to that found at NAF Atsugi (see general points). An examination of reported adverse health effects (e.g., asthma, cough) by wind direction (+/- time lagging) might also be attemped as a way to more pragmatically look for acute impacts.	As indicated in a response to an earlier comment, in order to compare the highest levels of ambient air chemicals at NAF Atsugi with levels known to cause acute effects in humans, toxicological information was collected during a literature search and presented in Appendix A: "Comparison of Maximum Concentrations of Chemicals Detected at Atsugi with Acute Health Effect Levels." Appendix A presented not only ATSDR Maximum Risk Levels (MRLs) but all data, including IRIS database, that was found in the literature regarding air concentration levels for all chemicals detected and corresponding health effects. The actual primary data used to derive the RfC has been examined, and the highest measured 24-hr concentrations detected at NAF Atsugi compared with the toxicological data to determine if acute effects could be occurring. This comparison has been made in the revised NEHC Summary report. A review of Appendix A indicates that

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		acrolein was found to exceed any acute health concentration level. For acrolein, 77 of 216 air samples collected at various sampling locations exceeded the acute inhalation MRL of 0.00005 parts per million (ppm). This MRL is based on eye irritation. All samples exceed the intermediate MRL of 0.000009 ppm. The intermediate MRL is based on respiratory effects of acrolein exposure as seen in laboratory animals. In the 1990 Toxicological Profile for acrolein, ATSDR states that the only known effects of acrolein exposure in humans are general respiratory congestion and eye, nose, and throat irritation. While the Navy conducted the comprehensive environmental sampling study at NAF Atsugi, health studies were also conducted to identify certain acute health conditions that either could be associated with exposure to poor air quality or were health conditions that concerned the NAF Atsugi community. One of the studies, the Children's Respiratory Health Effects Study, compares peak respiratory flow between children at Atsugi and Yokosuka. Please refer to response to comment Additional background information on the site and health complaints at NAF Atsugi under General Comments.
Page 15	P. 67, second last line: The intermediate inhalation "what" for vinyl chloride?	The text has been edited to read "the intermediate inhalation MRL for vinyl chloride"
Page 15	P. 68, first full paragraph: EPA suggests that the term MRL requires clear definition, and that this be done on page 66, close to where the first use of the term takes place.	The text has been edited as suggested.
Page 15	P. 69, probability of exceeding the 10 µg/dL Pb level: Again, the tone of this section implies a bright line criterion for risk of lead poisoning, which is not the case. "Benchmark" needs to be deleted, especially when associated with the CDC figures. EPA also notes the benefits	The word "Benchmark" has been replaced with "the action level". In the Navy Pediatric Blood Lead Poisoning Prevention Program screening blood lead, screening of low risk infants may be suspended provided that some conditions are met. The first condition is that large numbers of percentages

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	and reassurance provided by actually measuring Pb levels in humans, a situation which could be repeated regarding the dioxin levels.	of children have been screened in the community and found not to have elevated blood lead levels. Routine testing of pediatric blood lead to date has not indicated elevated blood levels in the NAF Atsugi community.
Page 15	P. 70, first paragraph: The comment that Branch Medical Clinic Atsugi personnel would have evaluated this slight elevation is inadequate. Did they, and was there any potential relationship to the SIC?	The Department of Defense policy on the assessment of health risk from lead is that blood lead levels of 10-19 ug/dl require confirmatory blood lead determination within one month of the first result. Confirmed 10-19 ug/dl blood lead results require a reassessment of the risk factors for exposure, education concerning diet and personal hygiene. If levels persist the policy requires the initiation of individual case management, environmental investigation, and lead hazard abatement. Re-screening is also required every 3 months. Upon confirmatory blood lead determination the child with the previous slight blood level elevation was found to have a blood lead level of less than 10 ug/dl. This paragraph has been added to text to clarify the issue.
Page 16	P. 70, fifth bullet: Breathing is not a significant health problem -- it is a good thing. We think you mean breathing difficulties, or somesuch.	The sentence preceding the bullets has been edited as follows: "These particulates have been associated with significant health problems and resulting related impacts including:" The bullet "Breathing" will now state "Breathing difficulties."
Page 16	P. 71, last sentence: This sentence needs to be reworded because you cannot reduce mortality, because it is always 100% eventually. The mortality rate can be reduced, or other time-related metrics used.	The word "rate" has been added to the terms mortality and morbidity.
Page 16	P. 72, last sentence, p. 73 table 4.6: The quoted dioxin risk, as well as not being caveated adequately as an upper bound estimate, also needs to incorporate mention of the pending revisions to the dioxin reassessment.	The entire subsection on Dioxin has been revised and includes a reference on the dioxin reassessment. A caveat indicating that the estimate on the background lifetime cancer risk is an upper bound value will be added to the sentence along with a footnote on Table 4-6.

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Page 16	P. 73, second last paragraph, dioxin soil levels: The statement that soil levels at Atsugi are essentially the same as in the urban US is somewhat contrary to the data provided by the EPA dioxin exposure assessment group, which indicate that levels at NAF Atsugi are elevated. The discrepancy could be clarified by using actual numbers in the text.	The comparison was made between U.S. urban and rural soils, and the NAF Atsugi soil concentration. The NAF Atsugi soil concentration of 15 ppt TEQ to which individuals are likely to be exposed was calculated as the average concentration through the entire base. At the same time it is recognized that soil concentrations nearer the SIC, on the GEMB site and golf course where much less exposure is expected to occur, are significantly higher at greater than 100 ppt for some samples. This paragraph has been clarified by mentioning in the text the actual values used in the comparison and the higher soil concentrations found in individual samples near the SIC.
Page 16	P. 75 and 76: Acetaldehyde is stated to be a class B2 carcinogen and acrolein a class C. While this is correct, it is important to at some stage mention which set of EPA guidelines are being used to make this classification. All chemicals going online to IRIS currently use both the 1986 EPA cancer guidelines (the source for the above mentioned classifications) and the EPA Draft 1996 Carcinogen Assessment Guidelines, which report cancer characterizations in a different manner.	The classification according to the 1986 EPA cancer guidelines has been cited when referring to carcinogenic classification for both chemicals.
Page 16	P. 78, end second paragraph: How does outdoor air (second last sentence) differ from ambient air (last sentence)?	Section 4, Health Risk Evaluation has been revised and no longer contains this sentence.
	Jinkampo Incinerator Complex (FAQ), p. 2, second bullet: This bullet should make note that the skin problems are only found at high levels.	Comment has been noted.
Page 16	Jinkampo Incinerator Complex (FAQ), p. 3, last answer: This needs to include the phrase "up to" before the 110 additional cases.	Comment has been noted
Page 16	Jinkampo Incinerator Complex (FAQ), p. 6: Noting the timing of siting and construction decisions at NAF Atsugi in the 1990s, full and	The FAQ mentioned by the reviewer is "Why did the Navy open two new housing towers so close the smokestacks?" The answer was "The

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	fair disclosure would suggest that these details be included in the background information on the incinerator controversy. Also, it would be hoped that the known air quality issues at the time of construction would have prompted the incorporation of appropriate air conditioning and cleaning apparatus at the new residential and childcare facilities, a situation that might help mitigate ongoing exposures.	Government of Japan programs all major building projects on U.S. military bases five to seven years in advance. The two towers closest the incinerator, Buildings 3101 and 3102, opened for occupancy in May 1996 and May 1997, respectively. Both towers were sited and constructed before the 1995 screening HRA report documented the level of health risks. The Navy is investigating the feasibility of installing special filtration systems in all residential towers to clean the incoming air as much as possible. The Housing Division has also issued portable air cleaners to all on-base residents." It is important to note that the ventilation systems in all residential buildings were all similar and called passive because they required action on the part of the occupant to cause fresh air infiltration. The educational buildings such as the elementary school and the child development as well as the Ground Electronics Maintenance building had active (forced fresh air input) ventilation systems. The reviewer's suggestion for inclusion of details regarding timing and siting of the residential towers has been addressed in the background part of Section 1 of the HRA summary report with respect to the close proximity of these buildings to the SIC. It has also been addressed in the rationale for the selection of the risk assessment scenarios considered in the risk assessment on Section 3.
	Specific Comments: Pioneer Assessment	
Page 17	P. 12, Section 2.1.1.2., Soil Trend Analysis: This section describes the methods that were used to test if a spatial correlation exists between soil concentration of COCs and the distance from the SIC source. The two methodologies (Thiessen Polygons and Kriging Analysis) are briefly explained. It would be valuable if the general results of the soil trend analysis could be presented to the reader in this Section,	Additional text describing the soil trend analysis and the results/conclusions has been added to the main body of the report. The results of the soil trend analysis were not used directly in the risk assessment. The purpose of these results was to assist in making risk management decisions about the human health risks at NAF Atsugi, Japan.

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	especially if the results were actually used to determine some of the risk calculations. The reader should not merely be referred to Section 7 and Appendix D. Also, it would be useful to know if there was a positive correlation between the two methods (i.e., do both methods predict the same trend?).	The PIONEER Report has been revised to state: "An overview of the results of the trend analysis is presented below. Appendix E presents a detailed discussion of the soil trend analysis. Three COCs were selected for the trend analysis based on their relative toxicity and because they represent different chemical classes (i.e., inorganics, semi-volatile organics, and dioxins/furans): ▪ Arsenic ▪ The Total Benzo(a)pyrene equivalent concentration (Total BaP TEQ) ▪ The Total 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) equivalent concentration (Total 2,3,7,8-TCDD TEQ) The results of the Thiessan Polygon and Kriging analysis were consistent. Elevated concentrations of Arsenic were observed throughout the base but no clear pattern of contamination was revealed via either method. Total BaP TEQs did not exhibit any spatial trends in concentration and distance from the SIC. Elevated concentrations were observed sporadically in the soil across the base. The concentrations of 2,3,7,8-TCDD TEQ clearly decrease as the distance from the SIC increases. Elevated concentrations of Total 2,3,7,8-TCDD TEQs in subsurface soil were typically collocated with elevated concentrations in surface soil."
Page 17	P. 12, Ambient Air Monitoring: This Section mentions how many samples were collected over a 14 month period but does not explain the timing or frequency of the sampling events. Other information is included, for instance, in Section 2.2 of the HHRA Summary, suggesting that a statistical sampling approach was developed that indicated six day sampling to be appropriate. It would be useful to include a little more discussion of this statistical approach and its implementation. For example, were the actual sampling events spread	Additional text has been added stating that sampling occurred on a six-day cycle for the first 12 months of sampling and that focused sampling (i.e., sampling during expected downwind events from the SIC) was performed for the last two months of sampling. In the text the reader has been referred to the Radian 2000 Sampling Plan and Site Characterization document for specific information on the sampling plan. The PIONEER Report was revised to state:

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	over equal time intervals during the 14 month period, or was sampling performed more often during time periods when the SIC was expected to have a higher impact on NAF Atsugi? Were more air samples collected at certain locations (e.g., living quarters)?	"In April of 1998 a 14-month ambient air monitoring program was instituted at NAF Atsugi in order to characterize the health effects associated with exposure to ambient air. The sampling occurred on a six-day cycle for the first twelve months of sampling. For the final two months focused sampling was implemented: samples were taken during expected downwind (from the SIC) events. For more information on the details of the sampling plan see the Radian 2000 Sampling Plan and Site Characterization. Over two thousand ambient air samples were collected and the results are described in the NAF Atsugi, Japan Ambient Air Monitoring Summary 21 April 1998 – 01 June 1999 (Radian, 2000). The samples were analyzed for multiple constituents including metals, semi-volatile organic compounds, pesticides, polychlorinated biphenyls, volatile organic compounds, and dioxins/furans."
Page 17	P. 13, Ambient Air Dispersion Modeling: This section explains that the ambient air monitoring results were used in combination with air dispersion modeling to calculate ground level air concentrations across NAF Atsugi based on the SIC as the point of emission. This section does not state which air model was used for the analysis. Was an Industrial Source Complex (ISC) point emission model used for this analysis or was a more general screening method used? It is difficult to visualize how a point emission model could be used if most of the SIC stack characteristics (e.g., gas flow velocity, average temperature, building downwash) are unknown. It would be helpful to include more explanation about how the model inputs were back-calculated from the air monitoring data.	The U.S. EPA Industrial Source Complex-Short Term (ISCST3 Version 98356) model was used for this analysis. Since ambient air dispersion modeling data was not used in the risk assessment, explanation about how the model inputs were back calculated from the air monitoring data has not been included in the Pioneer report, but more appropriately in the revised NEHC Summary report.
Page 17	P. 13 Section 2.1.3 Indoor Air and Indoor Dust: Under #1, the word "missions" should change to "emissions." Under #2, the acronym "RBSCs" is introduced without a definition. This term is discussed	Corrections have been made in the revised report.

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	later in Section 2.4. The same caveats apply, as noted above, concerning reliance on EPA Region III numerical screening values.	
Page 17	P. 14, Section 2.2, second bullet: Concerns were raised by EPA regional assessors that the treating of field duplicates as discrete observations reflected a misunderstanding of the Exposure Unit concept, and that field duplicates should either be averaged and subsequently included as one measurement, or the lower of the two values discarded.	The statement in the Pioneer report has been revised. Duplicate air samples were only collected at the GEMB for all chemical groups except for Hg, which was collected at every site. They were used to determine precision of sampling and they were not included in the determination of exposure concentrations. Duplicate soil samples were collected at every area of concern and used as discreet samples. However, since the risk contribution was 95% from air, double weighing caused by the use of duplicates as discreet samples does not contribute to a significant change in the total risk.
Page 18	P. 14, Section 2.2, page 14, eighth bullet: The steps involved in the CROP decision rule should be briefly explained, especially if the use of CROP figured prominently in the determination of exposure point concentrations.	The steps in the CROP decision rule have more clearly described in the revised report. In instances where analytical overlap occurred (i.e., results for a constituent were reported by different analytical methods for the same sample), a set of decision rules, called Compound Rules of Precedence (CROP), was applied to the data to select the concentration that should be used for risk assessment purposes (i.e., development of exposure point concentrations). CROP prioritize the selection based on the sensitivity of the analytical methods involved in the overlap. However, other factors, such as the whether or not the analyte was positively detected by both methods, are also considered. The CROP rules used to reduce the analytical data and develop the exposure point concentrations presented in Section 2.5 are described below. Analytical overlap was identified only in ambient air data for constituents in the following methods: 1. Gas Chromatography/Mass Spectroscopy (GC/MS; EPA Method TO-15) [CROP Level of Precedence: 1] and Semi-Volatile Organic

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		Compound (SVOC; SW8270) [CROP Level of Precedence: 2] 2. GC/MS (EPA Method TO-15) [CROP Level of Precedence: 1] and Aldehydes/Ketones (EPA Method TO-11) [CROP Level of Precedence: 2] 3. Mercury (Gold foil amalgamation) [CROP Level of Precedence: 1] and Hopcolite-Resin Mercury [CROP Level of Precedence: 2] A conditional level or precedence was used so that results with a higher level of precedence (indicated by the lower number) were used to develop EPCs in all cases except in instances where the result of a constituent with a higher level of precedence was not detected and the result for the lower level of precedence was detected. In these instances the lower level of precedence result was used to develop the EPC.
Page 18	P. 15., Section 2.3 Background Screening of COCs: On the same theme as the above comments, the Pioneer Assessment is overly brief in discussing the selection of the background soil site, and too quickly refers the reader back to a document not in the possession of the reader. It will be valuable to briefly explain the background soil site that was selected for NAF Atsugi and to explain why this background site would not be expected to be impacted by emissions from the SIC. Is this likely to be an "unimpacted site" or the least impacted site? This is an important point because the site was apparently used as background for both inorganic (possibly naturally occurring) and *organic* (not likely to be naturally occurring) constituents.	A brief explanation of the background site selection has been added to revised report. A suitable site-specific background soil site was identified as described in the *Phase II Soil Sampling Report Addendum to the March 1998 Report - NAF Atsugi, Japan* (Radian, 1999a). In summary, a list of optimum location criteria was developed. This list included several screening factors, with the main two being: 1) soils should be located under an impervious, protected cover; and 2) the cover should have been in place since before initiation of SIC operations (i.e., pre-1985). Multiple sites were identified and ultimately Building 47 – the Former Bachelor's Enlisted Quarters, located on the northwest portion of NAF Atsugi, was selected as the background sampling site. A total of twelve soil samples were collected from beneath the building.
Page 18	P. 15., Section 2.3.1 Soil: The second sentence states that the maximum detected background soil concentration of each COC was compared to the maximum detected soil concentration of each COC at	The text and tables have been clarified in the revised report. The maximum background soil concentration of each COC, not the average, was compared to the maximum detected soil concentration of each COC at the AOCs.

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	the AOCs. However, Appendix B, footnote 1 and table structure, imply that the average background soil concentration of each COC was compared to the maximum detected soil concentration of each COC at the AOCs. Any discrepancy in the actual approach should be resolved. EPA considers the latter approach (i.e., Appendix B) to be more conservative and appropriate to use for risk assessment.	Other summary statistics are presented to provide the reader with information on the range of concentrations observed.
Page 18	P.18., Section 3.1 Potentially Exposed Populations: The selection of potentially exposed populations and exposure pathways appears to be appropriate. Since the EPA was asked to address the methodologies and uncertainties associated with different risks for the various subpopulations, we note that the most recent EPA guidance for the assessment of risks from indirect pathways of exposure recommends that risks from breast feeding of infants should be evaluated (*Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*; Peer Review Draft; EPA530-D-98-001A; U.S. EPA; Washington D.C.; Office of Solid Waste; July 1998). The chemicals of concern for this situation are the highly lipophilic chemicals, which have the potential to bioaccumulate, and are transferred to milk fat (e.g., dioxins and other chlorinated hydrocarbons). As the risk from dioxin to the adult population at the residential towers is estimated at up to 10^{-5} (Table 5-6), it is possible that some additional exposure to infants could be occurring through breast milk.	NEHC's current medical recommendation is not to provide testing of dioxin in blood/breast milk for the following reasons: 3. Dioxin levels in blood/breast milk are not standardized medical tests; They are costly and are still primarily a research tool. Consequently, Dioxin values from testing would vary by method used in testing and by quality control efforts in the laboratory doing the test. 4. There are no medical guidelines for interpreting results in individuals. Consequently, knowing a person has X level of dioxin in their blood is all we would know. In addition, the NAF Atsugi population is of transient nature, which may make it difficult to differentiate prior from current exposures. Appropriate control groups may also be difficult to find. As pointed out by the reviewer, any increases would likely be small and may be difficult to distinguish from the control group(s). Instead the Navy recommendation is not to conduct blood or breast milk testing but rather continue to provide medical counseling and risk communication to base residents regarding the limitations of performing these tests.
Page 18	P. 20, Section 3, table 3-1, subscript 3: Five hours outdoors per day seems a very long time. Has this figure been checked, or does it apply to time outside the house for children, which may include time spent indoors elsewhere?	Text has been added to the revised report clarifying that the 5 hours is based on the EPA Standard Default Exposure Factors. Outdoor and indoor exposure to soil and dust were partitioned based on the amount of time an individual is outdoors. For adult and child residents it was assumed that 30% of time is spent outdoors. This value is based on information

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		presented in the USEPA Standard Default Exposure Factors, which indicates that residents spend 5 out of 16 waking hours outdoors. For all other exposure scenarios it was assumed that an individual spends a total of 2 hours outdoors per day.
Page 18	P. 22, Section 3, second paragraph: The assessment states that "exposure levels for carcinogens are ....(i.e. 70 years)." EPA assumes this means that for a 3 or 6 year residential exposure scenario the assessment takes the mean exposure level for each pollutant over that period of time and then averages over 70 years to come up with the cancer risk. The assessment may be improved by elaborating in this paragraph on just how the calculations were performed so that the reader will clearly understand. Also, Table 3-2 needs another footnote to define the acronyms in the equation at the top.	More text explaining how the risks for cancer and non-cancer risks were calculated has been added to Section 5 of the revised report. . "The PIONEER Report has been revised to state: "Exposure levels for carcinogens are averaged over the lifetime of the exposed individual (i.e., 70 years). This assumes that exposure to a carcinogen could cause cancer to develop subsequent to exposure, at any time in your lifetime. Exposure levels for noncarcinogens are averaged over the duration of exposure, which assumes that the effects of exposure to a noncarcinogen are seen at the time of exposure, and are directly related to the period of exposure. This concept is incorporated into intake calculations as the Averaging Time (AT) parameter. Calculation of the AT is shown in Tables 3-2 through 3-6."
Page 19	Page 23: Additional justification should be given regarding the choice of the adolescent soil ingestion rate as being the midpoint between the adult and child levels.	This value was selected based on professional judgment – in an effort to be protective and a reasonable estimate of exposure. The USEPA Standard Default soil ingestion rate for adult residents is 100 mg/day and the default soil ingestion rate for child residents is 200 mg/day. Therefore, for adolescents 150 mg/day (i.e., the midpoint between the adult and child ingestion rates) was used.
Page 19	Page 24: Ingestion of 200 mg/day of indoor dust was considered by an EPA regional assessor to be high for a child. The studies from which the child's soil ingestion rate was derived did not distinguish between soil and dust (fecal tracer studies). Consequently, an additional qualification should be added that consideration of 200 mg soil (table 3.2) and 200 mg of dust (table 3.3) per day represents a protective set of assumptions. The issue of the independence of exposure scenarios is briefly discussed on page 67, but requires further clarification in the	The 200 mg/day was obtained from the USEPA Standard Default Exposure Factors Handbook.

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	table and more detailed scenario development up front.	
Page 19	P. 25, Table 3-4, Exposure Parameter "AB": The acronym "CCS" needs to be defined. Does this refer to the Percutaneous Absorption Factors shown in Table 3-7?	CSS has been defined in the revised report. The reader is referred to Table 3-7. CSS = Chemical Specific Absorption Factor and it does refer to the Absorption Factors shown in Table 3-7.
Page 19	P 25, Table 3-4: Concern was raised by a regional assessor that the contact rate or soil-skin adherence factor is too high. The Exposure Factors Handbook shows a value of about 0.07 mg/cm^2 based on experimental data.	The contact rate (Adherence Factor) has been changed to 0.07 mg/cm^2 in the revised report. The contact rate used in the draft report is a conservative value. For example, the Adherence Factors (AF) presented in USEPA's Risk Assessment Guidance for Superfund are 1.45 mg/cm^2 for commercial potting soil and 2.77 for kaolin clay. Current information suggests that contact rates are body part and activity pattern dependent and have a wide range (i.e., < 1mg/cm^2-event to > 1 mg/cm^2-event). These contact rates are considered protective and reasonable.
Page 19	P. 30, Section 4.1, third full paragraph: EPA recommends modifying the first two sentences in the paragraph beginning with "the values presented...constituent." This is because the IRIS system was changed in 1996 and the RfC/RfD work group and CRAVE were disbanded in favor of a consensus approach across EPA Offices. A more appropriate text might be: "Many of toxicological summaries on IRIS were developed prior to 1996 and the information and values presented were verified by either the USEPA Reference Dose/Reference Concentration (RfD/RfC) Work Group or the USEPA Carcinogen Risk Assessment Verification Endeavor (CRAVE) group. IRIS entries in 1997 to the present represent USEPA consensus information. Chemical-specific health assessment information on IRIS is a result of a comprehensive review of chronic toxicity data by U.S. EPA health scientists from several Program Offices, Regional Offices, and the Office of Research and Development."	The text provided by the EPA has been incorporated to the revised report as appropriate.

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	You may wish to add all or portions of the following, as well: "The Integrated Risk Information System (IRIS) is an EPA database containing Agency consensus scientific positions on potential adverse human health effects that may result from chronic (or lifetime) exposure to environmental contaminants. IRIS contains chemical-specific summaries of qualitative and quantitative health information in support of two steps of the risk assessment process, i.e., hazard identification and dose-response evaluation. IRIS information includes the reference dose for non-cancer health effects resulting from oral exposure (the RfD) and the reference concentration for non-cancer health effects resulting from inhalation exposure (the RfC) and the carcinogen assessment information."	
Page 20	P.31, numbered points: The seven listings at the top of this page are confusing. Numbers 3 through 6 are difficult to distinguish. EPA suggests taking the appropriate text information from the preceding paragraph and placing it in the listing so that each item number is described.	The text presents the prioritization scheme that was used to identify and select toxicity values for constituents. The sources presented in the list are described on the previous page (Page 30.)
Page 20	P.31, items #5 and #6: It is not standard practice to use subchronic noncancer toxicity values as a direct surrogate for chronic toxicity values. If the subchronic value is used, then an additional Uncertainty Factor (UF) would be applied for extrapolating the animal data from a subchronic NOAEL to the chronic NOAEL. (Refer to the EPA methodology at http://www.epa.gov/iris/rfd.htm). A UF of 10 would usually be applied, which would reduce the subchronic RfD or RfC by a factor of 10.	The risk assessment has been revised to incorporate the recommendation. Surrogate chronic toxicity values were derived from subchronic toxicity values by dividing the subchronic toxicity value by a factor of 10.
Page 20	P. 32, Table 4.1: Although the EPA weight of the evidence categories	In the revised report a footnote has been added to table 4.1 that indicates

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	listed are still operative, it should be clearly noted that the Agency is moving toward a more narrative carcinogen characterization as described in the 1996 Draft Carcinogen Assessment Guidelines.	that the EPA is moving towards a narrative carcinogen characterization scheme.
Page 20	P.32, Unit Risks text under Table 4.1: EPA suggests that you give an example calculation in addition to the brief text description of inhalation unit risks. As it stands, one may not know what is meant by 'inhalation unit risk' and what the units are. An example calculation will show how the units cancel out. Also, in the case of children, what body weight is used in this calculation?	An example calculation of how Unit Risks (URs) are converted to cancer slope factors (CSFs) as described on page 32, has been added to the revised report. URs are converted to CSFs by multiplying the UR by 70 (kg body weight) and 1,000 (ug/mg conversion factor) and dividing by 20 (m^3/day inhalation rate.
Page 20	P. 32, section 4.3.2: Suggest modifying the title to read: Derivation of Oral Reference Doses and Inhalation Reference Concentrations.	The title has been changed Derivation of Oral Reference Doses and Inhalation Reference Concentrations in the revised report.
Page 20	P. 33, 2nd full paragraph: Suggest adding the following information on the RfC derivation: "The Inhalation Reference Concentration (RfC) is analogous to the oral RfD and is likewise based on the assumption that thresholds exist for certain toxic effects such as cellular necrosis. The inhalation RfC considers toxic effects for both the respiratory system (portal-of-entry) and for effects peripheral to the respiratory system (extrarespiratory effects). Inhalation RfCs were derived according to the Interim Methods for Development of Inhalation Reference Doses (EPA/600/8 88/066F August 1989) and subsequently, according to Methods for Derivation of Inhalation Reference Concentrations and Application of Inhalation Dosimetry (EPA/600/8 90/066F October 1994)." In the RfD calculation, EPA recommends using the term "uncertainty" factor rather than "safety" factor. EPA does not use the	The text has been changed in the revised report as suggested. The RfC calculation was not presented because RfCs were converted to RfDs for the purposes of evaluating multiple exposed populations in the risk assessment.

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	word safety factor unless specifying a factor to be added for additional protection, which is more a policy than a scientific decision. As the same calculation holds for the RfC, why not use the same general calculation for both?	
Page 21	P.48, Table 4-3, Inhalation Toxicity Values: The units for this table are unusual, given that Reference Concentrations are usual given as mg/m^3, and the inhalation slope factors as risk per $\mu g/m^3$. Why are the column headings in $kg\text{-}day/m^3$? Furthermore, EPA notes that for dioxin TEQs the oral cancer slope factor has been used. This is a reasonable action, but it does require a number of assumptions and conversions from the oral intake to the inhalation intake, such as percent absorbed, etc. EPA was unable to find clarifications to either of these questions in the table, and recommends that these be added. A clear separation is also needed between those RfCs/inhalation slope factors that come from IRIS, for instance, and those where some conversions were made.	As indicated in the text RfCs and Unit Risks were converted to RfDs and Cancer Slope Factors, respectively in order to evaluate multiple exposed populations. In the revised report a footnote has been added to Table 4-3 indicating this. The slope factor for dioxin is directly from EPA's HEAST FY-1997 -- Table 1 and was not derived or modified prior to use in the risk assessment. The source of the toxicity values presented in Table 4-2 and 4-3 are clearly presented in the SOURCE column of the table.
Page 20	P. 60, Table 4-4: Suggest defining in the table title precisely where the assessment searched for, and could not find, the toxicity information. For instance, there is copious toxicity information on ethanol, but, due to the as yet undefined data retrieval decision matrix for this table, this data apparently could not be used.	The sources of toxicity values that were searched are presented on Page 30. A footnote has been added to table 4-4 in the revised report indicating the sources that were searched to make it clear to the reader.
Page 20	P. 66, Purpose, bullet points: EPA recognizes that the discussion of what constitutes a safe level, benchmark or action level, etc., for cancer and non-cancer endpoints is difficult to summarize because there is always the need for the risk manager to take into consideration the site in question. As noted above, however, EPA is quite concerned that both the Pioneer Assessment and HHRA Summary have focused too strongly on the RfDs/RfCs/CSFs/10^{-4} etc.	Changes have been made in the NEHC report..

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	values being benchmarks, and EPA emphasizes that these values must be interpreted in light of the exposure situation under consideration. That said, the interpretations of "acceptable" risk measures presented in these bullet points are reasonable. This language refers to the general risk interpretation for the Superfund program and risk management decisions for Superfund sites. EPA has also presented some more specific risk management criteria for evaluating waste combustion facilities. The criteria are contained in a guidance titled: *"Implementation Guidance for Conducting Indirect Exposure Analysis at RCRA Combustion Units"* (EPA Office of Solid Waste; April 22, 1994). The criteria were presented as a set of "Acceptable Target Levels" intended to protect human health from risks posed by emissions from hazardous waste combustion units. The target levels are used to evaluate the results of risk assessments for stack emissions. They also provide a basis for recommending additional permit conditions and limits, if necessary, to ensure the protection of human health. The acceptable target levels may be summarized as follows: A) The total cancer risk due to high-end individual exposure to carcinogenic constituents should not exceed 1E-5 (i.e., an upper bound lifetime risk of one predicted case of cancer in a population of 100,000); B) For toxic chemicals, the high-end individual hazard index for the mixture of toxic constituents should not exceed 0.25; As stated in the OSW Guidance, these target levels were adopted in part to account for, and provide protection from, likely background exposure to contaminants that could occur in the vicinity of a given	

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	combustion unit. The Guidance states: *"The selection of these [target] levels (as opposed to, for example, an incremental cancer risk of 10^{-4} and a hazard quotient of 1.0) was done in part to account for exposure to background levels of contamination (including indirect exposures from other combustion units) which should be considered as part of the risk estimation and decision-making process to set emission levels at a combustion unit. The unit will not likely be the only source contributing to exposures in the study area and to neglect other environmental sources may overestimate an allowable emission level, leading to unacceptable total risk to the public. In this case, background is defined as those exposures in drinking water, food, and air attributable to sources other than the combustion unit(s) being assessed. If detailed information on background sources is available for a particular area, the permit writer may choose to use this information to develop an alternative approach for incorporating background levels."* The discussion above is presented by EPA for informational and comparative purposes, not as a formal recommendation for how the Navy should proceed on risk management issues at NAF Atsugi.	
Page 22	P. 66, Sections 5.0 and 5.1: The focus in these sections is on the RfD, which is unusual given that the principal risks are coming from the inhalation route, and thus the RfC and inhalation slope factors would be more relevant. As noted before, it should be made clear that the RfC is converted into an RfD before subsequent calculations are made, assuming this is the case. EPA's concerns on this section relate back to previously mentioned issues where it is difficult to follow the flow of the document because it is compartmentalized with no clear, up-front, explanation of what is being done. One suggestion would be to have a flow chart which shows all the calculations for both	In the revised report a note has been added to the section indicating that RfCs and Unit Risks were converted to RfDs and Cancer Slope Factors so that multiple exposure populations could be evaluated in the risk assessment. Table 5-3 presents the total risk by exposure pathway so that the reader can determine which exposure pathways are responsible for the majority of the risk. Table 5-4 presents the noncancer hazards segregated by the target organ/critical effect of the toxicity study that formed the basis of the RfC. Figure 3-1 (page 21) presents a flow-chart of the conceptual site model for NAF Atsugi, Japan Risk Assessment.

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	noncancer and cancer effects, accompanied by text and explanations as to the exposure scenarios under consideration. This would be extremely useful in trying to figure out what is being portrayed in very complex tables like tables 5-3 and 5-4, from whence the myriad calculation endpoints originate.	
Page 22	P. 80, Section 5.3.4 Lead Evaluation: EPA reviewers raised a concern that the finding of a 0.02% probability of a blood lead level of 10 ug/dL is abnormally low. This probability would result in a geometric mean blood lead below 2.5 ug/dL. Based on the listed inputs for NAF Atsugi (i.e., lead soil concentration of 26.6 mg/kg; lead air concentration of 3.9 ug/m^3) in the IEUBK LEAD99d model, an EPA reviewer was unable to reproduce the listed result (The value of 26.6 mg/kg was used as the outdoor and indoor soil lead concentration together with a constant ambient air concentration of 3.9 ug/m^3. The values found for the age range from 0 - 84 months were a 0.18% probability of blood lead at 10 ug/dL with a geometric mean of 2.6 ug/dL). In any case, there does not appear to be a significant probability that the CDC health recommendations for blood lead in children would be exceeded at NAF Atsugi. However, it should be noted that the site-wide RME lead air concentration of 3.9 ug/m^3 is well above the quarterly lead NAAQS of 1.5 ug/m^3.	The IEUBK model runs have been re-evaluated to ensure that they are correct. There was a typographical error in this section. The site-wide RME lead air concentration should read 0.39 ug/m3 not 3.9 ug/m3. Since 0.39 ug/m3 is below the NAAQS value for lead the note will not be added.
Page 23	P. 80, third paragraph: The lead level in the child is reported as 10 - 19 µg/dL. Why is such a broad range reported, and why are we not given the actual measure? For instance, the CDC lead guidelines make a clear distinction between 10 - 14 and 15 - 19, where an elevation to 11 is clearly different from an elevation to 19. It would be reassuring to have a little more information on this exceedance value, subject of course to patient confidentiality necessities.	The PIONEER Report has been revised to state: "Note: The Department of Defense policy on the assessment of health risk from lead is that blood lead levels of 10-19 ug/dl require confirmatory blood lead determination within one month of the first result. Confirmed 10-19 ug/dl blood lead results require a reassessment of the risk factors for exposure, education concerning diet and personal hygiene. If levels persist the policy requires the initiation of individual case management,

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		environmental investigation, and lead hazard abatement. Rescreening is also required every 3 months. Upon confirmatory blood lead determination the child was found to have a blood lead level of less than 10 ug/dl. This paragraph has been added to text to clarify the issue.
Page 23	P. 93, Recommendations: Recognizing that the EPA is not intimately familiar with the NAF Atsugi site and that the Navy has the lead in this, we offer the following thoughts on the recommendations for consideration. Regarding Recommendation #1, the Agency notes that limiting childhood exposures to 32 months and adults to 98 months cannot be considered a solution, in itself, but may be a valuable adjunct to other management actions. As stated above, these time limits are overly "accurate" and are actually associated with significant hazard indices and cancer risks. A particularly disturbing factor militating toward recommendation #10 is the information in Pioneer Assessment Section 1.2.1, where it is stated that the incinerator is already equipped with a battery of pollution control devices that may be underutilized or not properly operated. Even if more proper operation of the incinerator was achieved, the design characteristics and appropriate waste feed limits of the incinerator need to be examined. If this combustion device was designed to be a municipal waste incinerator, it may never effectively operate to provide the proper destruction efficiency and pollution control needed for proper treatment of the wide description of listed wastes, including trash and (apparently) hazardous waste. The first bullet under recommendation #2 could provide some risk reduction from acute exposures, but would not seem to be an effective chronic risk reduction method since outdoor contaminants migrate indoors and may actually achieve higher concentrations in the indoor	Risk management recommendations have been deleted from the Pioneer and NEHC reports.

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	environment. This recommendation could well be linked to recommendation 8, air conditioning of residential and school quarters, which presumably would not be difficult as the quarters are only a few years old and presumably have well performing equipment. The other recommendations seem logical, but only the implementation of recommendation #10 would result in a significant method to minimize SIC emissions and chemical exposures. The problem remains that the location of the quarters and facilities so close to the SIC emission stacks fundamentally exacerbates any problems. In this regard, EPA notes that the Japanese government is part of a global United Nations Environment Program negotiation on Persistent Organic Pollutants (POPs), scheduled for completion late 2000/early 2001. It is our understanding that the Japanese government is adopting, or has adopted, dioxin emission standards for new sources. Under the draft UNEP agreement, Parties are also encouraged to retrofit BAT to existing incinerators.	
Page 23	Appendix C, Table C-1 and following tables: These Tables appear to contain some misprints in the columns under "Carcinogenic Risk (CR)." For example, the child cancer risk for outdoor inhalation of acetaldehyde is listed as 6.05E-7 and 2.28%; but the outdoor inhalation cancer risk from Bis(2-ethylhexyl)phthalate is listed as 6.94E-1 and 0.00%. The "6.94E-1" value is probably actually "6.94E-10."	The tables in Appendix C have been corrected so that the cancer risks are correctly printed (i.e., the Carcinogenic Risks field needs to be made wider so that the risk numbers print correctly).

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	SUMMARY	
Page 2	A lack of proper planning was evident in the risk assessment and appeared to cause inconsistencies in the objectives of the data collection and risk assessment. The purpose and objectives of the risk assessment were not consistent and not clearly stated.	Although the subcommittee was provided with a sampling plan document and quarterly summary reports the subcommittee speculates that poor planning is the cause for differences in wording of the specific objectives of the risk assessment in different documents. While we recognize that the wording on the objectives was different in various documents that were written by different people, the objectives implied by each were the same. All individuals agreed on the objectives at the initial kick off meeting. However, when the NRC subcommittee addressed the issue of different objectives, it was clear how they derived a conclusion that the objectives were different. The sampling plan addresses all of the elements needed in a sampling and QA/QC plan to collect meaningful data. The documents provided to the subcommittee did reflect the extensive and continuous planning that was conducted during all phases of the data collection, risk assessment and data interpretation. Nevertheless, NEHC added a subsection in Section 1 on planning, that include the details on the planning that were not mentioned in the NEHC report before. In the revised report, NEHC has also referred to a site visit report and additional monthly project review reports that were not submitted to the subcommittee to demonstrate and emphasize that planning and periodic (monthly and quarterly) reviews were indeed carefully conducted.
Page 2	The purpose and objectives of the risk assessment were not consistent and not clearly stated.	NEHC has clarified the objectives to ensure consistency.
Page 2	For future risk assessments of this nature, NEHC should follow a general risk-assessment framework, such as those discussed in *Science and Judgment in Risk Assessment* (NRC 1994), and *Framework for Environmental Health Risk Management* and *Risk*	We are familiar with each of the documents cited, and are not clear what specific methodology is being recommended, since the NRC framework for conducting a risk assessment is identical to the EPA Superfund methodology. Upon request for clarification, the NRC subcommittee has

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	Assessment and Risk Management in Regulatory Decision-Making (Presidential/Congressional Commission on Risk Assessment and Risk Management 1997a,b) and should consider the use of independent peer reviewers to oversee the entire assessment process, including the planning stages.	neither provided specifics regarding the recommended methodology to follow nor citations that we can obtain where others have followed that recommended methodology. Considering that an EPA risk assessment was being conducted, NEHC did involve various independent peer reviewers from EPA through all stages of the risk assessment, beginning with the planning stages. EPA NCEA RTP and their FTIR contractor accompanied NEHC and its contractors on the initial site-scoping visit to Atsugi and continued their involvement throughout the process.
Page 3	The most appropriate methods were not used to determine the contribution of the incinerator complex to health risks at NAF Atsugi. The excellent and innovative air-dispersion modeling, used in conjunction with correlation analyses, would be the most appropriate method to determine the contribution of the incinerator complex to the health risks at NAF Atsugi.	The determination regarding the method to be used to assess the contribution of risk from the incinerator was thoroughly evaluated. A tremendous amount of deliberation went into selecting the method that we used. We addressed the issue with EPA personnel and also with a group of expert statisticians from the Research Triangle Institute, Research Triangle Park, North Carolina. The NRC selected very positive words to discuss a dispersion modeling approach to the risk assessment while many negative ones were used in discussing EPA RAGS methodology that uses actual versus modeled data. The underlying reason for the strong support of modeling is not clear for the following reasons: (1) The dispersion modeling approach determined that only 6 of the 336 chemicals monitored showed a strong correlation with the SIC. In addition, since dispersion modeling was performed using ambient air concentrations to estimate stack emissions, the use of dispersion modeling to predict the contribution of the SIC would only yield a circular logic (2) Associated magnitudes of error are likely to be high because of unknown SIC operation parameters (stack velocities, stack temperature, emission rate) and waste composition data (3) The emission rate estimation

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		analysis varied by 2-4 orders of magnitude. The NRC did not address the additional inherently large uncertainty with the use of dispersion modeling although other uncertainties are very clearly addressed by the NRC. This approach has been encouraged by EPA. NEHC sent a written request to the subcommittee for instructions on how to use the dispersion modeling approach used by Radian to determine the contribution of the incinerator complex to the health risks at NAF Atsugi. The subcommittee chose not to reply to our request for instructions in writing, but agreed to a phone conference that included only two members of the subcommittee. During the phone conference, the two reviewers withdrew their recommendation to use a dispersion modeling approach and did not articulate instructions on the approach. They recommended a new approach but couldn't articulate instructions on how to conduct the new approach. Furthermore they indicated that they could not ensure that the approach would provide valid results. As this recommendation to use the dispersion modeling has now been rescinded and these subcommittee members admitted that the new approach could include just as much uncertainty as the NEHC approach, NEHC chose to retain the approach that was initially presented to the subcommittee for review. The approach used by NEHC was actually the approach recommended by the previous NRC Committee on Toxicology that reviewed the 1998 screening risk assessment and stated the following: "Another approach that might be useful for getting a rough estimate of the contribution of incinerator emissions to ambient air, relative to the background, would be to compare results from Location 1 (upwind site) with those from downwind locations on days when the wind direction is out of the south-southwest and relatively constant." The subcommittee specifically mentioned that the "upwind site" (named so because of the

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		frequency at which it is upwind from the SIC) should be used for the upwind downwind comparison. However, it is intuitively obvious that upwind and downwind depend on specific wind direction on a particular day.
Page 3	NEHC used outdoor-air samples as surrogates for indoor air, but such substitution is not appropriate	The objective of the HRA was to determine the risk that could be attributed to ambient air emissions from point and non-point sources impacting the air quality at NAF Atsugi. Since concentrations for the majority of the constituents exceeding RBCs were found to be higher indoors than outdoors indicating probable indoor air sources (e.g., insulation, carpets, and household chemicals) and ambient air is the source of constituents in indoor air that are associated with emissions from the SIC, indoor-air samples could not be used for the purposes of quantitative risk assessment because, as pointed out by the subcommittee, they would overestimate the impact of the SIC and other ambient air point and non-point sources. The concentrations could be even higher if sampling occurred during occupancy, because of activities such as cooking, use of household cleaners and smoking. Since indoor air concentrations could not be used in the HRA to calculate indoor air exposures from outdoor air infiltration without overestimating the risk due to the contribution of indoor air sources, the most conservative alternative was to use ambient air concentrations as surrogates for indoor air concentration.
Page 3	At almost all sites, air sampling was conducted for 14 months, with the last 2 months of sampling apparently being collected at times when the contribution of the incinerator was expected to be high. The potential biases in that collection protocol are not discussed in the report or accounted for in the data analysis.	Since no stack sampling was permitted to be conducted on this foreign owned incinerator one of the greatest challenges in this project was to meet the second objective, i.e., to determine the SIC contribution to the health risk. The method we initially employed to determine the SIC contribution was to identify the chemicals in air that are emitted from the SIC by correlating wind direction (specifically the percentage of time an individual monitoring site was downwind of the SIC), to the chemical concentrations observed in ambient air at the site. The hypothesis is that, for chemicals

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		that are emitted from the SIC, the chemical concentration (and also risk) increases as the percent of time that the wind blows emissions from the SIC onto the base increases. In the case of variable wind speed and direction, from one week to the next, if the emissions are constant but the wind speed and direction are not the same, the correlation with percent downwind will be different. The confidence in the correlation of wind direction versus concentration is related to the number of observations that are used to calculate the correlation coefficient and the wind directions that are observed. During the 1998 ambient air sampling study, there were few periods of southerly winds, even fewer than that indicated by historical wind roses. As a result, there were relatively few data points to correlate concentrations/percent downwind in an effort to assess SIC contribution. Therefore, sampling was extended for an additional 2 months and samples were collected on days predicted to be downwind toward NAF Atsugi from the SIC to complete the correlation plots. To complete the correlation plots, the extended sampling included 6 additional sampling days when the wind was blowing toward the base. The additional sampling also provided better representation of historical exposure conditions. Conducting the risk assessment without this additional data could result in an underestimation of long-term exposure conditions and consequently risk. Therefore the additional 6 days of data were used to calculate the risk. The additional number of sampling days needed to provide additional information for the correlation analysis plots was determined by statistical analysis so that no bias would result by overweighting particular wind directions and overestimating the contribution from the SIC.
Page 3	The interpretation of the risk-assessment results by NEHC is not appropriate, given that a Superfund type of risk assessment was conducted.	With this comment the subcommittee seems to place the Superfund type of risk assessment in a somewhat negative context, particularly since NEHC is directed subsequently to a number of NRC publications for other methodology. NEHC selected the superfund methodology because (1) It is

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		widely used throughout the United States because of regulatory decision making and therefore has legal precedence; (2) It uses real data to reduce the uncertainty of modeling; (3) It has received much peer review from the scientific community including the NRC and is updated periodically by issuing supplemental guidance; (4) It provides a basis for measuring risk related to a particular source; (5) The specific methodology is the most used tool in the US for risk management; and (6) It is a process identical to NRC's and previously based on NRC documents.
Page 3	The NEHC report should characterize the uncertainties in the risk assessment, including all the principal uncertainties identified in the supporting documents.	NEHC has expanded the subsection on Uncertainties in Section 3 "Human Health Risk Assessment Results" to include additional uncertainties that were addressed in the supporting documents.
Page 3	The conclusions of the risk assessment should be presented in such a way that uncertainties in the data and process that led to the conclusions are evident.	The conclusions have been revised in the final NEHC report pointing out the uncertainties associated with the risk assessment.
Page 3	The report should discuss the health-surveillance studies that have been conducted at NAF Atsugi.	Health surveillace studies have been reported in two separate reports. The third study is still in progress. While the Navy conducted the comprehensive environmental sampling study at NAF Atsugi, health studies were also conducted to identify certain acute health conditions that either could be associated with exposure to poor air quality or were health conditions that concerned the NAF Atsugi community. One of the studies, the "Children's Respiratory Health Effects Study", compares peak respiratory flow between children at Atsugi and Yokosuka. The second, the "Pregnancy Outcome Study," compares spontaneous abortion rates between Atsugi residents and residents of other bases in Japan. An additional air pollution related morbidity medical surveillance is still in progress. It compares rates of skin conditions and respiratory symptoms seen at the NAF Atsugi Branch Medical Clinic and Naval Hospital Yokosuka. The

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		first two studies are mentioned in the revised report and they are included as appendices D and E. Naval Base Yokosuka served as the control location for the studies. This was done for two specific reasons. First, Yokosuka, which is approximately 25 kilometers from Atsugi, is also located on Japan's Kanto Plain. Its population, climate, and vegetation are similar to that at Atsugi. In addition, other than the highly visible point source of pollution at Atsugi (i.e., the Shinkampo Incinerator Complex), sources of air quality degradation are similar. Secondly, Yokosuka is the site of the Navy's primary medical treatment facility in Japan, Naval Hospital Yokosuka, which provides access to several healthcare databases. The study on "Respiratory Effects in Children "had two primary goals: 1. Identify differences in respiratory symptoms and lung function between children who live or go to school at NAF Atsugi and similar children at Yokosuka. 2. Determine if there were more respiratory symptoms in children who live or go to school at NAF Atsugi on days when they are exposed to higher levels of pollutants from the Shinkampo Incinerator during the four week study period (7 May-5 June 1998). The study focused on children since their health is a major concern of the NAF Atsugi residents. Children's lungs also tend to be more sensitive to the effects of air pollution. Fifth and sixth grade students at Atsugi and Yokosuka DOD Schools participated. One hundred twenty-seven (127) students volunteered for the study. Eighty (80) of the students lived on base at NAF Atsugi, 17 lived off base at NAF Atsugi and 30 lived at Yokosuka. The children's lung function was tested each school day during lunchtime. Children recorded the number of hours spent outdoors as well as respiratory and/or air quality related symptoms such as, trouble breathing, coughing

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		during the day or night, feeling bad, runny nose, cold, headache, and irritated eyes. A daily symptom score was given to each child based on the information recorded. Data from ambient air monitoring at Shirley Lanham School was also collected for PM10, nitrogen dioxide and sulfur dioxide, known to cause respiratory effects. Wind direction and wind speed were also recorded, in an attempt to associate health effects with environmental pollution conditions. The primary findings of this study were: 1. There were no differences in the respiratory health of children living on or off base at NAF Atsugi and those at Yokosuka. 2. Children living on base at Atsugi reported more runny noses than the Yokosuka children did. 3. All other reports of symptoms were similar. 4. There was no difference in the reported number of colds between the Atsugi on base and the Yokosuka groups. Children living off base at Atsugi did report more colds. 5. Most of the children in the study group had lung function better than that of the general population in the United States. 6. The wind was blowing toward the school for only a short period of time during the four-week study period. As a result, no clear relationship between wind direction and the levels of gases and dust particles could be identified. Complete information on this study can be found in the report *Air Pollution From the Shinkampo Incinerator Associated with Adverse Respiratory Effects Among Children at NAF Atsugi Study (NEHC Jul 99).* The study on "Pregnancy Outcomes" was conducted because many residents expressed concern during the November 1997 NAF Atsugi Public

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		Meeting about the health effects the Shinkampo Incinerator may be having on their families regarding miscarriages. Therefore the study was designed to describe the rate of miscarriage, at NAF Atsugi and other naval facilities in Japan. Information for the study was gathered by looking at hospital and clinic records for past pregnancies. This was a retrospective study where only documented miscarriages versus live births were considered. The study population consisted of Navy personnel or their dependents who were pregnant at some point between June 1995 and May 1998 and lived on or near NAF Atsugi or other naval facilities in Japan serviced by Naval Hospital Yokosuka (NHY). Information used to calculate the miscarriage rates came from three different sources, Delivery Logs and Pathology records at NHY and the Prenatal Log at the Atsugi Branch Medical Clinic. Data collection took place during the summer of 1998. It included the number of live births and the number of miscarriages. The total number of pregnancies with known outcomes during the study period was 1862. For the purposes of this study, a miscarriage was defined as an unintentional pregnancy loss at up to the 28th week of pregnancy. Multiple births were excluded from the analysis. The miscarriage rate was defined as the number of miscarriages divided by the total number of pregnancies examined (the number of babies born plus the number of miscarriages). The findings of the study were: 1. The overall miscarriage rate for patients with known pregnancies from Atsugi, Yokosuka, Iwakuni and Sasebo between June 1995 and May 1998 was 7.1%. This rate was determined by review of the delivery log and pathology records at NHY. When the Atsugi patients are subtracted, the miscarriage rate for the other areas is 7.8%. 2. Review of the NAF Atsugi Branch Clinic prenatal log, during the same

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		period, indicates a miscarriage rate at NAF Atsugi, of 8.8%. However, the data used in this study came from different sources and contain some different information. Therefore, the miscarriage rate at NAF Atsugi cannot be directly compared to that of the other naval facilities that were part of this study population. 3. The NHY and NAF Atsugi miscarriage rates during the study period were both lower than the documented rate of miscarriage for women in the United States, who know they are pregnant, which is between 10% - 15%. 4. This study was conducted with the limited information that was available in various records. The results suggested that the risk of miscarriage at NAF Atsugi and other naval facilities within Japan are at the low end of the expected risk range described for the population of the United States. Complete information on this study can be found in the report *Pregnancy Loss at NAF Atsugi Japan (June 1995-May 1998) (NEHC Sep 99).* The continuing air pollution related medical surveillance indicates that: 1. There were no significant differences in air quality related morbidity between the adult populations at Atsugi and Yokosuka during the study period. There were no significant differences in air quality related morbidity between the Child (below 18 years of age) populations at Atsugi and Yokosuka during the study period. 2. There was a peak period of respiratory disease complaints at Atsugi from June –August 1998. This is an artifact of the comprehensive risk communication and health consultation program that was at its height during that period. 3. There was a peak period of respiratory disease complaints at Yokosuka beginning in November 1998 and persisting through January 1999. This represents an outbreak of Japan Type A Influenza during that period.

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Page 3	Information on Japanese standards should be included in the report.	NEHC has edited the report to include information on Japanese air quality standards that are similar to the US National Ambient Air Quality Standards.
Page 3	The report should begin with a clear statement of the purpose and objectives of the risk assessment, and it should include more details of the methods, assumptions, uncertainties, and limitations of the risk assessment.	NEHC has edited the report to clarify the purpose and objectives of the risk assessment, and it has expanded the sections describing more details of the methods, assumptions, uncertainties, and limitations of the risk assessment in the report.
Page 3	The report should be thoroughly referenced, including references to specific sections of the many supporting documents.	NEHC has edited the text to include more specific references to the supporting documents. A reference section has been added to the NEHC report.
Page 3	When drawing conclusions and making recommendations, NEHC should clearly distinguish between those based on science and those based on policy	In the revised NEHC report, a specific subsection has been added to address policy-based versus science-based approaches for evaluating health risk. A summary discussion on policy-based and science–based conclusions has also been included in the conclusions section.
Page 3	NEHC should also describe the ways in which stakeholders have been involved in the policy decisions as recommended by many advisory groups for appropriate risk management practice .	This information was included in the risk communication plan of the Draft NEHC Summary document, which is now Appendix F in the revised NEHC Summary document.
	PLANNING OF THE RISK ASSSESSMENT	
Page 4	In future risk assessments, NEHC should consider the use of independent peer reviewers—beyond the management group mentioned in Appendix B—throughout the project (including the planning stages) to evaluate objectives and proposed methods, to ensure that the project remains focused on the objectives, and to critique the final document	Considering that an EPA risk assessment was being conducted, NEHC involved various independent peer reviewers from EPA throughout the development of the risk assessment, beginning with the planning stages. EPA NCEA and EPA RTP and their FTIR contractor accompanied NEHC and its contractors on the initial site-scoping visit to Atsugi and continued their involvement throughout the process.

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Page 4	When planning a risk assessment, NEHC should follow the basic framework for making risk-management decisions that has been laid out for risk assessments. … NEHC is directed to those reports for general guidance and frameworks for design of risk assessments like the one at NAF Atsugi.	NEHC is familiar with the recommended reports and has followed the basic framework needed for risk management decisions that have been laid out for risk assessment. This framework is identical to the framework in the EPA Risk Assessment guidance for Superfund.
	Objectives of the Risk Assessment	
Page 4	Even the overall objective of the risk assessment is not clear; NEHC should be clear that it was trying to determine whether there is a problem at NAF Atsugi, not that it was trying to show that there is a problem.	NEHC has edited the report to clarify the purpose and objectives of the risk assessment. This project was designed to collect data to meet the objectives of the comprehensive health risk assessment which were: 1. Estimate the potential human health risks to U.S. Navy personnel and their families and other individuals living and working on NAF Atsugi, Japan resulting from exposure to constituents of concern (CoCs) in soil, ambient air, indoor air, and indoor dust. This estimate focuses solely on CoCs that are likely to be associated with ambient air emissions and/or subsequent deposition from point and non-point sources impacting the air quality at NAF Atsugi. 2. The contribution of the risk attributable to the Shinkampo Incineration Complex (SIC). NEHC did not have a preconceived hypothesis that there was/was not a problem at NAF Atsugi, but developed a sampling plan to make this determination. The mere presence of uncontrolled emissions from an incinerator adjacent to the base indicates the potential for exposure and therefore a potential risk.
Page 5	The main text of the NEHC report should identify the population at risk, define sensitive subpopulations that are of special concern, and describe who or what is meant by "sensitive receptors" (see Section 3.2.1; Radian 1998a).	NEHC has expanded Section 3 Human Health Risk Assessment Results to include details on all steps of the EPA risk assessment methodology used in this health risk assessment (Data Evaluation, Reduction, and Screening; Exposure Assessment; Toxicity Assessment; Risk Characterization;

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		Uncertainty Analysis). The expanded subsection on Exposure Assessment identifies the populations at risk, defines populations that are of special concern and defines children as the sensitive receptors.
Page 5	The report should provide information on the size of the military population at NAF Atsugi, on the composition of that population (including age and percentage of women, children, and infants), and on the number of retired military and nonmilitary personnel employed on the facility.	NEHC has edited Section 1 of the report to include more details on the size and composition of the military population at the time of the survey conducted for the Exposure Pathways Analysis (June 1998), such as the number of active duty personnel and dependents, civilians and dependents, the number of children under 6 or in the age group of 6-18 years of age. The following text has been added: "The NAF Atsugi population is approximately 7,500 when sailors, residents, and workers are present, of which 81.1% is composed of active duty members and their dependents, 1.22% are Department of Defense employees such as teachers and their dependents, 5.02% are Civil Service employees and their dependents and 12.65% are Master Labor contractors including Japanese nationals. Seventy-five percent of the population live on-base and 25% off-base. It is estimated that approximately 6,000 are adults. There are approximately 446 dependents under 6 years of age and about 916 dependents between 6 and 18 years old living on base versus 129 and 180, respectively, living off-base."
Page 5	Information on the average duration of a tour at NAF Atsugi and the frequency with which the standard tour is extended would also be helpful.	NEHC has edited Section 1 of the report to include information on the average duration of a tour at NAF Atsugi and the frequency with which the standard tour is extended. The following text has been added: "Military personnel are typically stationed at NAF Atsugi for 3 years (1 Tour of Duty), however the tour can be extended to 6 years (2 Tours of Duty) or more."
	Sampling	

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Page 5	If FTIR monitoring was expected to detect pollutants more often, the question arises of whether a change in the incinerator complex resulted in pollutant concentrations lower than in the past.... If that is the case (the supporting, documentation seems to indicate that contaminant concentrations were lower than expected), the report should discuss the decreases.	Since in previous screening risk assessments (NEHC 1995), maximum concentrations of VOCs above the FTIR detection limit were observed for benzene (84 $\mu g/m^3$), ethylbenzene (100 $\mu g/m^3$), toluene (420 $\mu g/m^3$), o-xylene (42 $\mu g/m^3$) and p-xylene (130 $\mu g/m^3$) collected in 30-second Summa canisters samples, it was anticipated that the FTIR would have been an appropriate real time indicator of air quality. However, during this monitoring effort, SIC operating conditions could have changed so that gaseous concentrations of the target pollutants were not present above the FTIR system's minimum detection limits with a frequency that would allow a statistical analysis addressing its objectives. This discussion has been added to the subsection on the FTIR in the report.
	The NEHC report (p. 11) states that a statistical method indicated that outdoor air sampling should be conducted every 6 days, but the subcommittee was unable to locate a discussion of any such statistical method or its application. The relevant section of the planning document (Radian 1998a; pp. 3-11 to 3-13) states only this: "Air samples will be collected approximately every six days. For each sampling event, analytical results will be obtained for VOCs [volatile organic compounds], mercury, acid gases, and PCDDs/PCDFs (dioxins/furans). Aldehydes and ketones, heavy metals, PCBs, pesticides, PM_{10}, $PM_{2.5}$, and SVOCs [semivolatile organic compounds] will be analyzed every other sampling event, or every 12 days. [The air-sampling plan] will yield approximately 60 outdoor air samples at the elementary school for those chemicals measured during each sampling event and approximately 30 for the remaining chemicals. Such sample sizes are likely to lead to a great deal of	No statistical analysis was performed to derive the every sixth day sampling schedule. U.S. EPA air toxics sampling programs call for the collection of air samples every 6th or 12th day. This schedule, which rotated through the 7 days of the week and over a one-year period, produced nearly equal numbers of samples from each weekday. This schedule is used for EPA's Urban Air Toxics Monitoring Program (UATMP) and their Photochemical Assessment Monitoring Stations (PAMS) studies. A draft paper ("Air Toxics Monitoring, Concept Paper", Office of Air Quality Planning and Standards, Revised Draft, February, 29, 2000) by EPA states: "The selection of sampling frequencies will be guided by the data quality objective (DQO) process. DQOs are currently under development and will provide recommendations on the need to sample according to the typical UATMP sample frequency of once every 12 days, the frequency of VOCs collected at PAMS sites of one in six days, or the frequency to be used at $PM_{2.5}$ speciation trend sites and IMPROVE (Interagency Monitoring of Protected Visual Environments) sites of once in three days."

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	precision in the estimated RMEs [reasonable maximum exposure]. For this comparison, either 30 or 60 upwind and either 90 or 180 downwind samples will be available. This is considered to be an adequate number of samples to make a valid comparison." Statistical analyses, which should have been conducted using air measurements from previous years, were needed during the planning stage to determine the number and frequency of samples required if conclusions regarding the health risks and contributions of the incinerator were to be drawn. Such analyses were conducted for the soil monitoring, but not for the air monitoring.	
Page 6	It is not clear how the decision to collect only eight samples was made. It is also not clear how collecting eight indoor-air samples could answer the question "What is the inhalation exposure risk for sensitive receptors in buildings likely to be impacted by the Jinkampo Incineration Complex?" (Radian 1998a; Section 3.2.1) or could determine the impact of the incinerator complex.	The decision to collect eight samples from each AOC was based on the number of samples required to obtain reasonable exposure point concentrations for risk assessment calculations. Exposure point concentrations are based on 95% upper confidence limits (UCLs) for the mean. The UCL is computed as $\bar{x} + t_{0.95,n-1}\frac{s}{\sqrt{n}}$, where $\bar{x}$ is the sample mean, s is the sample standard deviation, n is the sample size, and $t_{0.95,n-1}$ is the 95th percentile from a student's t-distribution with n-1 degrees of freedom. The quantity $t_{0.95,n-1}\frac{s}{\sqrt{n}}$ reflects the expected precision in the estimate of the mean (i.e., the distance that $\bar{x}$ may be from the true (population) mean). The smaller the variability (reflected by s), and the larger the sample size, the closer $\bar{x}$ is expected to be to the population mean. The UCL reflects this expectation. The larger s is and the smaller n

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		is, the larger the quantity $t_{0.95,n-1}\frac{s}{\sqrt{n}}$ will be, and hence the higher the UCL (and the exposure point concentration) will be. Because the exposure point concentration is based on the UCL, it is 95% certain to overestimate the true average exposure concentration. The degree to which the true average may be overestimated depends on the sample size (n) relative to the variability (s). For indoor air, preliminary discussions led to the conclusion that an assumed relative standard deviation (standard deviation divided by the mean) of 75% was a reasonable a priori estimate of variability within an AOC. Based on plots of precision versus sample size for a relative standard deviation of 75%, eight samples is 95% certain to yield a mean that is within 50% of the true mean. This was considered to be a reasonable sample size.
Page 6	Furthermore, indoor-air samples were collected only for an 8-h period (NEHC 2000; p.17), which is not long enough to fulfill the study objectives. The only rationale provided for that sampling duration was a limitation in homes because the sampling pumps were noisy, but that limitation is not discussed in the planning documents, nor is the possibility of using quieter pumps. It was pointed out that further sampling would have been pointless for the high-volume samplers in the low-infiltration-rate locations because the samplers already sample all the available air several times over, but a rationale for the limitation in high-infiltration-rate locations is needed. In addition, it is not clear why a particular apartment was chosen for sampling and whether any consideration was given to other factors, such as smoking in the apartment.	There were several reasons for the 8-hour sampling periods, a number of which were logistical. An important objective of the study design was to "…measure indoor air concentrations with a sensitivity and selectivity comparable to the ambient air measurements (Radian 1998, QAPP, page 4-16)." It was believed that this approach would be able to prevent the occurrence of exposure estimates for the risk assessment based on "not detected" default values. Therefore, it was proposed to use the same commercial high volume instrumentation and methodology as that used for the ambient monitoring since that would allow direct comparisons between the ambient and indoor measurements. Additionally, we know of no commercially available alternative sampling methods that would have been unobtrusive, quiet, and able to collect sufficient sample volumes, to directly compare with the ambient air methodology.

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		We believe that the 8-hour sampling periods were sufficient to fulfill the study objectives. During each monitoring period, active outside ventilation was curtailed so that the various chemicals could be collected without continuous dilution. In practice, many of the units (day care center and school) were recycling internal air and had outside make-up air held to a minimum. For all the residential units, the volume of air sampled exceeded the actual volume of air inside the unit, therefore, additional sampling would not have collected additional constituents. Calculations were then performed (Appendix L) to account for this re-sampling. For the larger units (e.g., locations with larger internal volumes than the actual air sampled) this volume correction was not required and had the sampling continued for a longer period, we would have needed to perform volume calculations on these samples also. In order to find residential units for monitoring, Base Housing solicited volunteers from the various apartment units. Finding individuals who would volunteer their apartments was a difficult challenge each monitoring quarter. Lifestyle issues were not considered in apartment or townhouse selection. Specifically, however, smoking was not an issue as smoking was banned in all buildings on the base, including individual apartments and living quarters. In addition to finding residents to volunteer for the study, there were many logistical considerations and limitations to be considered. For instance, the school cafeteria could only be sampled when students were not present (after 14:00), the Ground Electronics Maintenance Building could only be monitored when Navy staff were present (7:00 to 16:00), the day care center could only be monitored when the center was vacant, and the residential units (apartments and townhouses) could only be sampled when the

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		residents were not home between the hours of 7:00 and 17:00, at a mimimum. NEHC has included a discussion of the effects of lifestyle factors in the report. The effects were higher concentrations of chemicals indoors than outdoors, due to interfering factors, such as building materials, furnishings and life style factors, e.g. smoking, cooking, cleaning, pets, etc. except for the chemicals that were associated by correlation analysis with the incinerator.
Page 6	NEHC should also discuss other behavioral patterns that could affect the risk assessment; such as the proportion of time residents at NAF Atsugi spend indoors versus outdoors.	There are literally, a myriad of different risks that can be calculated for different activity patterns, simulating real-world exposures. For example, one could be at the elementary school for part of the day and at the high rise for the rest of the day; be at ground electronics building for part of the day and the high rise for the rest of the day; be at the golf course on weekends and work at the elementary school the rest of the week and live in the high rise, etc. This was pointed out in the draft NEHC report on page 61. The air pathway drives at least 85% of the risk at each of the five locations. Therefore to assist in determining if there would be a significant difference for individuals being on base 24 hours per day, regardless of when monitoring was conducted, we calculated the risk related to the air pathway for a 24-hour exposure at each of the 5 locations monitored. The results indicated that there was no significant difference or in some cases no difference at all in the risk, no matter where you are on base; therefore, the risk calculated at the high rise should be considered the plausible upper bound risk for individuals spending 24 hours on base, no matter the location in which those hours were spent.

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	Risk Communication	
Page 6	There does not seem to have been a coordinated strategy for risk communication. Such a strategy should have been developed with objectives that are among the overall objectives of the project.	Appendix B of the draft NEHC report (now Appendix F in the revised NEHC report) is a Risk Communication Plan, which was developed to address stakeholders' concerns regarding potential health impacts caused by the poor air quality at NAF Atsugi. The *Comprehensive Risk Communication and Health Consultation Plan for Naval Air Facility Atsugi, September 1998* was written at the direction of Dr. Bernard Rostker, Assistant Secretary of the Navy (ASN) for Manpower and Reserve Affairs (M&R). Dr. Rostker directed BUMED to take the lead in developing the plan, in April 1998. BUMED extensively coordinated the plan with Commander in Chief, U.S. Pacific Fleet; Commander Naval Forces Japan; Naval Air Facility Atsugi; Branch Medical Clinic Atsugi and Bureau of Naval Personnel. Dr. Vincent Covello, Center for Risk Communication, New York, New York, validated the plan. The purpose of the plan is to set forth implementing procedures to provide formal risk communication to everyone on-board NAF Atsugi and personnel with orders to NAF Atsugi. It also sets forth implementing procedures to conduct mandatory health consultations for high-risk individuals assigned to NAF Atsugi. This plan is designed to provide the best possible and most comprehensive health risk communication and health consultation available so as to allow our Navy personnel and their families to make personal and informed choices. This plan will remain in effect until the NAF Atsugi health issues are resolved.
Page 7	The risk-assessment project also seems to lack a fundamental understanding of stakeholders' needs and concerns and a clear process that could be used to update and improve risk communication.	Prior to developing the risk communication plan, a public availability session was held which addressed stakeholder concerns. Additionally the base established a Shinkampo Action Team that was comprised of NAF Atsugi personnel and community members to establish an open dialogue with community members. The Branch Medical Clinic in Atsugi was also

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		very involved in addressing concerns of the community and they participated in the Shinkampo Action team meetings. Furthermore the health studies conducted (Appendices E and F of the revised NEHC report) were in direct response to the community.
	DATA ANALYSIS	
	Attributable Risk	
Page 7	The attributable risk has not been adequately evaluated. Pioneer Technologies Corporation listed five ways "to identify the potential impact of emissions from the SIC [Shinkampo Incinerator Complex]" (Pioneer 2000; p. 82): 1. Comparing the risks due to ambient air when the SIC is ON to when the SIC is OFF (Radian, 2000). 2. Comparing the risks due to ambient air when the SIC is ON, and a site is downwind of the SIC, to when the SIC is OFF (Radian, 2000). 3. Comparing the risks due to ambient air when the SIC is ON, and a site is downwind of the SIC, to when the site is not downwind of the SIC (Radian, 2000). 4. Using the results of the correlation analysis to model concentrations, and subsequently calculate and compare risks, at sites when the site is downwind of the SIC and when the site is not downwind of the SIC. 5. Comparing the risks due to ambient air when the SIC is ON and a site is downwind of the SIC to another site which is upwind of the SIC on the same days (i.e., an "Upwind" versus "Downwind" evaluation). Pioneer (2000) states that those approaches are discussed in various places in the report, but the subcommittee could not find, in any of the documents provided, an adequate evaluation of whether any of the	As acknowledged by the subcommittee in their summary of their peer review comments on page 2, the NEHC "report is a summary of more detailed reports prepared by Pioneer Technologies Corporation, Radian International, and other contractors, which performed the sampling and risk assessment." Lengthy and complete discussions on the first three approaches are provided in the Radian Air Monitoring Summary Report (Radian 2000). Due to their lengths they were not included in the Pioneer or the NEHC report, but they were referenced as to where the reader could find these discussions. A discussion on all alternatives on how they do/do not meet the objective of the risk assessment has been added to the NEHC report. Alternatives 1 and 2 were not selected because there generally was no relationship between concentration and percent downwind for the SIC OFF background scenario for the six key chemicals that were found to be related to the SIC. This same lack of correlation is true for most of the other chemicals as well. In the few cases where there was a significant correlation when the incinerator was OFF, the relationship was not consistent across sites, and the concentrations when the incinerator was OFF were well within the range of typical concentrations (i.e., there are no cases where the most extreme concentrations occur when the incinerator is OFF).

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	approaches met the objectives of the risk assessment.	Alternative 3 was not selected because the average concentrations under this background scenario (SIC ON and the site is not downwind from the SIC) were more variable during this scenario than when it was OFF. One potential explanation is that the SIC was only OFF on Sundays, the same day that most other industries in the area also were closed. Although it is possible that the increase in variability could be due to SIC effects, it is more likely that the increase is due to other industries in the area. From a risk assessment perspective, alternative 4 is not a good method because it only accounts for six chemicals that were identified in the correlation analysis as exhibiting a statistically significant correlation between concentration and percent downwind of the SIC. Experience from risk assessments performed on municipal waste incinerators performed in the United States indicates that multiple chemicals are being emitted from the SIC (EPA 1998a). Using the correlation analysis approach to quantify the contribution of the incinerator to the health risks would result in an underestimate of the SIC's contribution especially for non-cancer health effects since a potentially large number of chemicals are unaccounted for. Cancer risks would also be underestimated; however, the level of underestimation is not expected to be significant because Dioxin-TEQ, which typically dominate the cancer risks, is one of the six chemicals that correlate with % downwind of the SIC. Also, as detailed in the Radian 2000 Report [Section 2.5; p. 32 - 33], there are many site-specific factors (e.g., the variable composition of municipal waste and emissions from multiple point and non-point sources) that should be considered when evaluating the results of the correlation analysis method. Alternative five (i.e., the upwind vs. downwind analysis) was selected to quantify the contribution of emissions from the SIC to the risk estimates

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		because it accounts for chemicals present in air that may be attributable to the SIC but were not identified, as such, in the correlation analysis. This approach that is complementary to the correlation analysis approach was needed because of the limitations of the correlation analysis.
Page 7	Two methods—of the Research Triangle Institute (RTI 1999), and Radian (2000d)—that are similar to each other were used to determine the contribution of the incinerator facility by correlating the concentrations of various pollutants measured in the air samples with the fraction of the sampling period during which the measurement site was downwind of the incinerator (that is, the "percent downwind"). The Research Triangle Institute method (RTI 1999) also used a nonparametric correlation analysis to estimate the impact of the incinerator facility. Neither analysis was interpreted quantitatively, nor were the two methods' results compared.	Correlation analysis definitely is a quantitative analysis method (as opposed to just constructing plots and drawing conclusions based on visual inspection, for instance). RTI tested the significance of the results using statistical significance tests, which also are quantitative, and evaluated the assumptions behind the various calculations. It is incorrect to call this a "qualitative" analysis. We assume what the reviewer is calling qualitative is the fact that we did not use the correlation/regression results to construct prediction models or to estimate concentrations that could be used as input into a risk assessment. In all of the discussion/interpretation, we say the results either indicate a significant relationship between chemical concentrations and an opportunity to be impacted by the SIC or do not indicate a significant relationship. We typically did not quantify that relationship (e.g., we didn't say that a 10% increase in the time a site is downwind of the SIC corresponds to a concentration of X). That really isn't necessary because the interpretation of the results was entirely consistent with the goals of the data evaluation -- to assess whether there was an empirical relationship between the observed concentration and the opportunity to have been impacted by the SIC. It is unclear what additional quantification of the results in the interpretation would have added.
Page 7	The possibility of "sector-sampling" (switching pumps on and off as the wind direction changes) is discussed but dismissed as impractical and unnecessary for VOCs in the Field Sampling Plan (Radian 1998a,	Sector sampling devices collect samples only when the winds are from a pre-defined wind direction sector. To accomplish this task, each piece of monitoring equipment would require a direct link to a meteorological

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	p. 4-13). The subcommittee believes, however, that "sector-sampling", or some similar method, might well be necessary to evaluate the incinerator contribution to exposure.	station, a data logger, and switching equipment. A program would also be required to turn each piece of equipment on and off and determine the period of time the wind would need to be in or out of the wind sector before the equipment was turned on or off. The only way comparable data could have been gathered during this program using a sector sampling approach would have been to use sector sampling for all sample types. To conduct sector sampling for the nine different sample media that were collected during the Atsugi project would have been a massive undertaking requiring an enormous amount of methods development and a substantial additional outlay of resources. As resources were not unlimited during this project, using more conventional and accepted methodology was warranted as the budget could not have supported the methods development required to implement a sector sampling approach for 9 different sample media. There are additional logistical constraints with using a sector sampling approach. The level of detection for each sampling method is based on the analytical detection limit and the sample volume (e.g., the volume of air collected during a sampling run). If a sector sampling approach were to have been employed, it is possible that the sample duration required for some of the methods to collect sufficient sample volume to achieve adequate detection limits could have taken days or even weeks. While this may have resulted in a more "focused" sample, the logistics of leaving sorbent media exposed for days or weeks would have produced passive deposition on the samplers and would have resulted in drastically increased blank concentrations for many of the techniques. If a defined sample period had been used (e.g., samples were run for a fixed time period regardless of sample volume), it is likely that some samples would not have collected sufficient sample volumes to achieve desired detection limits while other

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		samples may have collected too much sample volume and experienced break-through. Trying to use sector sampling (e.g., motors being frequently turned on and off) with high volume air sampling techniques would also have placed significant stress on the induction motors used in the samplers. This would have resulted in a high rate of sampler failure and consequently reduced data capture rates. We believe that the approach of categorizing samples, based on the percentage of time the sampler was downwind of the incinerator, is a valid and useful approach. It is our opinion that a sector sampling approach would have resulted in reduced data capture and a much smaller data set of qualified data.
Page 8	The models used in the correlation analyses are not justified in either the RTI report (1999) or the Radian report (2000a). The correlation analyses consisted principally of fitting a straight line to the relation between percent downwind and the measured concentration or its logarithm, or between rescaled versions of those variables. Such relationships have no physical basis, so it is difficult to interpret the results.	We concur that a simple linear model with a single explanatory variable ("percent downwind" or a transformed version of this variable) does not provide a complete physical model for concentration. Other factors such as wind speed, temperature, and downwash certainly also affect the concentration at a given site on a given day. However, percent downwind is a reasonable surrogate for the degree to which a site may have been affected by the incinerator on a given day. The objective of the correlation analysis was to understand whether observed concentrations are related to the degree to which a site is potentially affected by the incinerator and *not* to create an atmospheric dispersion model. The models included in the Radian report successfully meet the objective. We do not concur that the results are difficult to interpret. A significant positive relationship indicates that concentrations tend to be higher when the location is downwind of the facility than when it is not, and that the concentrations increase as the

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		percent of time a site is downwind of the incinerator increases.
Page 8	As is often the case with environmental measurements, the air-concentration data appear to be approximately lognormally distributed; the distribution should be taken into account in the statistical analysis. Either a least-squares approach to a nonlinear physical model (if the data are log-transformed) or a statistical approach that can account for nonnormal errors should be used.	Three statistical approaches applying correlation and regression analysis were used to determine which chemicals are associated with the SIC, one method used by Radian and two other methods used by RTI. Regarding the method used by Radian, we agree that the distribution of the data should be taken into account in the statistical analysis, and the distribution *was* taken into account. Appendix C of the Radian report provides an explanation of the assumptions behind the calculations presented in the report, one of which is that the regression residuals are normally distributed. As stated in the report, the distribution of the residuals was evaluated, and the specific form of the correlation was tailored to the outcome of that evaluation. For each analyte, three correlation analyses were run: one using untransformed concentrations, one using log-transformed concentrations, and one based on the ranks of the concentrations. The results presented in the report correspond to the model whose residuals were most consistent with normality. If neither the untransformed-concentration residuals nor the log-transformed-concentration residuals were normally distributed, then a nonparametric correlation based on the ranks of the data was used. In regard to the RTI statistical approaches, we disagree in two main respects with the statement that the air-concentration data appear to be lognormal and that this distribution should be taken into account in the analyses. (1) In fitting a statistical regression model that allows the mean concentration level to vary as a function of independent variables (e.g., site, percent downwind, day), the concentration data are not required to have any particular distribution; rather, it is the residuals from the model that may need to follow some specified distribution (e.g., normal or lognormal) in order to justify optimality of the estimation method and/or the validity of tests of significance for the model parameters. We believe that measurement

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		errors in concentration measurements do tend to increase with concentration level, so that log-scaled concentrations are more likely to exhibit the homogeneous variances assumed in the regression estimation. Hence, we did utilize log-scaled concentrations in our mixed-model analyses. (2) An analysis that relies on the fact that data (or residuals) follow a particular distribution is generally more powerful than a nonparametric approach when the data do follow that distribution; when there are deviations from the assumption, however, such an analysis can produce inaccurate estimates and an analysis that does not rely on such an assumption is preferred. Hence, in addition to the regression methods, we utilized a nonparametric correlation approach that is not tied to any particular assumption about the underlying distributional form. We regard the fact that, in this analysis, we do not have to make any assumption about the underlying distribution as a strength, not a weakness, of the approach. Thus we did utilize "a statistical approach that can account for nonnormal errors."
Page 8	Pioneer (2000) selected what it called the upwind-versus-downwind approach, but no documentation provides the exact method used, and neither the method nor whether the designations of "upwind" and "downwind" are representative of overall exposures could be determined from the available documentation. The approach uses unverified and possibly unjustified assumptions, and the logic behind the selection of sites for comparison is not clear. The ground-electronics maintenance building (GEMB) is fairly obvious as the site most affected by the incinerator complex, but no rationale is provided for selecting the golf course as the upwind comparison site. The selection of the golf course is particularly surprising in that the "criteria site" - a site southeast of the incinerator facility and considered upwind of the incinerator – was original selected as the upwind site and designated as the background site in the sampling	The PIONEER and the NEHC Reports have been revised to clarify the upwind versus downwind comparison. Both the Golf Course and Criteria site are considered "upwind" of the SIC when the wind is blowing from the south to the north (as was the case with the data selected for this analysis). The Golf Course site was selected for the Upwind vs. Downwind comparison because it is closer to the SIC than the Criteria Site and would potentially be impacted by emission sources that are located between the Criteria Site and the SIC. If the Criteria Site was used in the comparison, then the risks attributable to the SIC could potentially be overestimated because the Criteria Site is not impacted by emission sources located between it and the SIC.

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	plan. The Pioneer document (Pioneer 2000; p. 8) provides the following rationale for ignoring the criteria site: The criteria site is located southeast of the SIC. No workers, residents, or recreational users are located at this site. Therefore, it was not evaluated in the risk assessment. That rationale, however, only addresses the use of the criteria site for the evaluation of the total health risk at NAF Atsugi. It does not address the use of the criteria site for evaluating the contribution of the incinerator.	
Page 8	The calculated risk estimates raise the related question of whether the incinerator contributions are important compared with variations among sites that could be caused by sources other than the incinerator. The large difference between "average" and "RME" estimates in Tables 5-2 and 5-10 of the Pioneer report (Pioneer 2000) suggests that the available data might not be sufficient to show important differences among sites and that the differences could be due to random variation. The subcommittee recommends that NEHC investigate whether there are statistically significant differences in risk estimates among the various sites.	By definition the RME estimate is the maximum exposure that is reasonably expected to occur at a site. Because of the uncertainty associated with any estimate of exposure concentration the upper confidence limit (i.e., the 95 percent upper confidence limit) on the arithmetic average is used for this variable. Large differences between the average and the RME are irrelevant to the subcommittee's statement that the large difference between "average" and "RME" estimates in Tables 5-2 and 5-10 of the Pioneer report (Pioneer 2000) suggests that the available data might not be sufficient to show important differences among sites and that the differences could be due to random variation. An investigation on whether there are statistically significant differences in risk estimates among the various sites may be interesting; however, it would require an extensive effort and the results of this investigation would not change the overall results of the risk assessment.
Page 8	The subcommittee believes that the dispersion analysis, in conjunction with the correlation analyses, provides the best approach for determining the contribution of the incinerator facility to pollution	This recommendation is not clear for the following reasons: (1) The dispersion modeling approach determined that only 6 of the 336 chemicals monitored showed a strong correlation with the SIC. In addition, since

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	at NAF Atsugi. Although the model has some limitations, the subcommittee recommends that the dispersion modeling and correlation analyses, not an upwind-downwind comparison, be used to determine the risk attributable to the incinerator facility.	dispersion modeling was performed using ambient air concentrations to estimate stack emissions, the use of dispersion modeling to predict the contribution of the SIC would only yield a circular logic (2) Associated magnitudes of error are likely to be high because of unknown SIC operation parameters and waste composition data (3) The emission rate estimation analysis varied 2-4 orders of magnitude. The NRC does not address the additional inherently large uncertainty with the use of dispersion modeling although other uncertainties are very clearly addressed. The approach used by NEHC was actually the approach recommended by the previous Committee on Toxicology that reviewed the 1998 screening risk assessment and stated the following: "Another approach that might be useful for getting a rough estimate of the contribution of incinerator emissions to ambient air, relative to the background, would be to compare results from Location 1 (upwind site) with those from downwind locations on days when the wind direction is out of the south-southwest and relatively constant." The use of the upwind-downwind approach has also been encouraged by the EPA reviewers NEHC sent a written request to the subcommittee for instructions on how to use the dispersion modeling approach used by Radian to determine the contribution of the incinerator complex to the health risks at NAF Atsugi. The subcommittee chose not to reply to our request for instructions in writing, but in a phone conference held 10 April 2001, that included only two members of the. During the phone conference, the two reviewers withdrew the recommendation to use dispersion modeling and correlation analyses to determine the risk attributable to the incinerator facility. They

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		suggested yet another new approach but did not articulate instructions on the new approach. Additionally they indicated that the new approach would be an extensive statistical effort, which may not provide any useful information. As this recommendation has now been rescinded and the subcommittee admits that new approach includes just as much uncertainty as the NEHC approach, NEHC chose to retain the upwind-downwind approach that was initially presented to the subcommittee for review
Page 9	The Pioneer risk-assessment report (Pioneer 2000) provides four reasons why ambient air concentrations were used as surrogates for indoor air concentrations (see p. 13), but they do not provide an adequate rationale for the substitution in light of the stated objectives for the overall risk assessment (Pioneer 2000; p. 1):	NEHC has edited the report to clarify the objectives of the overall risk assessment. As acknowledged by the subcommittee in this peer review, initially when the sampling plan was developed, the purpose of the indoor air samples was to provide exposure estimates for NAF Atsugi residents and dependents that would be used in the risk assessment. Another purpose of the indoor air sampling was to evaluate indoor air quality at Atsugi by comparing it with indoor air quality in the U.S. However, since the objective of the risk assessment for indoor air was to calculate risk due to ambient air sources, including the SIC, the ambient air concentrations had to be used as surrogates for indoor air concentrations in the risk assessment because: 1) Concentrations for the majority of the constituents exceeding RBCs were found to be higher indoors than outdoors indicating probable indoor air sources (e.g., insulation, carpets, and household chemicals). If we are trying to determine the risk due to ambient air infiltrating indoors, using indoor air samples that also measure contaminants generated by indoor sources would overestimate the impact of the SIC and other ambient air point and non-point sources 2) Passive ventilation systems are used at most locations which make attempts to quantify the contribution of risk attributable to emissions from

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		the ambient air sources highly uncertain. If we are trying to determine the risk due to ambient air infiltrating indoors, using indoor air samples that also measure contaminants generated by indoor sources would overestimate the impact of the SIC and other ambient air point and non-point sources. 3) Ambient air is the source of constituents in indoor air that are associated with emissions from the SIC and other ambient air sources. If we are trying to determine the risk due to ambient air infiltrating indoors, using indoor air samples that also measure contaminants generated by indoor sources would overestimate the impact of the SIC and other ambient air point and non-point sources.
Page 10	The first reason provided for the substitution of outdoor air measurements for indoor air concentrations is: 1. The objective of collecting the indoor air samples stated in the Sampling and QA/QC Plan to Assess Health Risks Related to Air Quality at NAF Atsugi, Japan (Radian, 1998) was to make a comparison between concentrations found indoors in the United States with concentrations found at NAF Atsugi. The indoor air samples were not intended to determine the contribution of [emissions] from the SIC to concentrations of constituents in indoor air. The subcommittee, however, is unable to find any indication in the final sampling plan (Radian 1998a) that the objective of the indoor-air sampling was to compare indoor-air concentrations at Atsugi with indoor-air concentrations in the United States. The indoor-air data-quality objectives clearly are based on the requirement to estimate risks associated with indoor inhalation, as is seen in Section 3.2.1 (Radian 1998a):	NEHC disagrees with the subcommittee that comparing risks at Atsugi and in Los Angeles was interpreted as the entire objective. To avoid misunderstanding of the indoor air sampling purpose this reason has been deleted from the list of reasons why surrogates were used in calculating indoor air risk. NEHC's lack of clarity in stating the objectives of the HRA has led the subcommittee to disagree with NEHC's approach regarding the use of outdoor surrogate concentrations to evaluate indoor air risk due to chemicals likely associated with ambient air emissions infiltrating indoors. In the revised NEHC report, NEHC has clarified the objectives to ensure consistency between the NEHC report and all supporting documents. The overall objectives have been clarified as follows: This project was designed to collect data to meet the objectives of the comprehensive health risk assessment which were: 1. Estimate the potential human health risks to U.S. Navy personnel and their families and other individuals living and working on NAF Atsugi, Japan resulting from exposure to constituents of concern (CoCs) in soil, ambient air, indoor air, and indoor dust. This

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	The question to be addressed by the indoor air sampling effort is: 1. What is the inhalation exposure risk for sensitive receptors in buildings likely to be impacted by the Jinkanpo Incineration Complex? That that was an objective is reinforced by a response to a comment on the sampling plan (Radian International, unpublished data, January 27, 2000): "The purpose of the indoor air monitoring is to provide exposure estimates for Atsugi residents and dependents that will be used in the risk assessment. These exposure estimates should be representative of a normal or typical total exposure. Although the incinerator emissions are expected to have an adverse effect on indoor air quality, it is not the intent of this project to measure or estimate the differential risk due to the operation of the incinerator. Rather, the goal is to estimate the total risk due to indoor chemical exposures at Atsugi, e.g., is there more risk to live at Atsugi vs. Los Angeles. "The example given in that comment- comparing risk at Atsugi and in Los Angeles- seems to have been interpreted as the entire objective. A sampling plan designed to compare indoor air at Atsugi and the United States, however, would not be designed to collect data suitable for the overall objectives of the project. In addition, what NEHC means by "normal or typical total exposure" should be explained.	estimate focuses solely on CoCs that are likely to be associated with ambient air emissions and/or subsequent deposition from point and non-point sources impacting the air quality at NAF Atsugi. 2. The contribution of the risk attributable to the Shinkampo Incineration Complex (SIC). Therefore to meet the objectives of the HRA, indoor air sampling was conducted to answer the following HRA question: What are the risks to receptors from inhalation of indoor air and dermal contact or incidental ingestion of dust contaminated by CoCs infiltrating indoors that are likely to be associated with ambient air emissions and/or subsequent deposition from point and non-point sources impacting the air quality at NAF Atsugi? As indicated by the subcommittee, the words "normal or typical total exposure" came from an unpublished response to a NEHC comment on the draft sampling plan (Radian International, unpublished data, January 27, 2000). These words are not in any of the reports. The Radian staff responding to the comment used these words to mean "representative exposure".
Page 10	The second stated reason for the substitution of outdoor air measurements for indoor air concentrations is: Concentrations for the majority of the constituents exceeding RBSCs [risk-based screening concentrations] were higher indoors than outdoors indicating probable indoor air sources (e.g., insulation, carpets, and household chemicals). Using indoor-air samples that also measure contaminants generated by indoor sources would not affect the use of those samples to	NEHC agrees with the subcommittee's observation that using indoor-air samples that also measure contaminants generated by indoor sources would not affect the use of those samples to estimate the potential health risks to people living at NAF Atsugi. However, as clarified in the revised report, our objective is to determine the indoor air risk due to chemicals likely associated with ambient air emissions infiltrating indoors. Having clarified this objective, it is clear that these samples might overestimate the impact of the incinerator unless the contributions of sources unrelated to the

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	estimate the potential health risks to people living at NAF Atsugi, although it might overestimate the impact of the incinerator unless the contributions of sources unrelated to the incinerator can be removed from the exposure estimate.	incinerator can be removed from the exposure estimate, as recognized by the subcommittee on page 10 of their peer review document.
Page 10	The third stated reason [for the substitution of outdoor air measurements for indoor air concentrations] is: Passive ventilation systems are used at most locations which make attempts to quantify the contribution of risk attributable to emissions from the SIC highly uncertain. The use of passive-ventilation systems does not preclude the use of those samples for estimating the overall health risks at NAF Atsugi.	As clarified in the revised report, our objective is to determine the indoor air risk due to chemicals likely associated with ambient air emissions infiltrating indoors. The use of passive ventilation (no outside air is forced indoors), will preclude the use of those samples for estimating indoor air risk due to chemicals likely associated with ambient air emissions infiltrating indoors.
Page 10	The fourth stated reason [for the substitution of outdoor air measurements for indoor air concentrations] is: Ambient air is the source of constituents in indoor air that are associated with emissions from the SIC. Although the emissions might be the source of the indoor contaminants, that does not preclude the use of indoor-air measurements to estimate the human health risks at NAF Atsugi.	As clarified in the revised report, our objective is to determine the indoor air risk due to chemicals likely associated with ambient air emissions infiltrating indoors. The use of indoor-air measurements to estimate the human health risks at NAF Atsugi due to ambient air chemicals infiltrating indoors might overestimate the impact of the incinerator unless the contributions of sources unrelated to the incinerator can be removed from the exposure estimate, as recognized by the subcommittee on page 10 of their peer review document.
Page 10	When comparing the concentrations of contaminants in indoor air at NAF Atsugi with the concentrations in US homes (NEHC 2000; p. 22, and Table 2.5, pp. 25-26), it is not stated whether the status of doors and windows was recorded during indoor sampling.	Unfortunately this information was not available from the studies.
Page 10	More complete information is essential, [on HVAC] especially if NEHC is trying to justify the use of outdoor-air concentrations as a	More information has been added to the NEHC report discussing the types of HVAC in each building sampled for indoor air.

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	surrogate for indoor concentrations in its risk assessment.	
	Use of Data from Final 2 Months of Sampling	
Page 11	The subcommittee is concerned about potential biases in the monitoring because of the change from the original sampling plan to directed sampling (that is, when NAF Atsugi was predicted to be downwind of the incinerator complex) during the last 2 months. That change was not adequately justified and was not accounted for in the analysis.	Since no stack sampling was permitted to be conducted on this foreign owned incinerator, one of the greatest challenges in this project was to meet the second objective, i.e., to determine the SIC contribution to the health risk. One method we used to identify the chemicals in air that are emitted from the SIC was to correlate wind direction, specifically the percentage of time an individual monitoring site was downwind of the SIC, to the chemical concentrations observed in ambient air at that site. The hypothesis is that, for chemicals that are emitted from the SIC, the chemical concentration (and also risk) increases as the percent of time the wind blows emissions from the SIC onto the base increases. In the case of variable wind speed and direction, from one week to the next, if the emissions are constant but the wind speed and direction are not the same, the correlation with percent downwind will be different. The confidence in the correlation of wind direction versus concentration is related to the number of observations that are used to calculate the correlation coefficient and the wind directions that are observed. The rationale for a two-month extension of the ambient air sampling program at NAF Atsugi is summarized below: 1. An analysis of the wind patterns observed during the 1998 sampling program indicates the winds were atypical for the period. Specifically, when compared to historical meteorological data, there were fewer periods of southerly winds, which carry emissions from the Shinkampo Incineration Complex (SIC) onto the base. May and June historically had significant periods of southerly winds, and extending sampling could result in ambient air concentrations that are more representative

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		of historical conditions for evaluation in the risk assessment (if the winds during the extension period are consistent with the historical wind patterns). In other words, during the 1998 ambient air sampling study, there were few periods of southerly winds, even fewer than that observed by historical wind roses. As a result, there were relatively few data points to correlate concentrations/percent downwind in an effort to assess SIC contribution. Therefore, sampling was extended for an additional 2 months and samples were collected on days predicted to be downwind days (i.e., toward NAF Atsugi from the SIC) to complete the correlation plots. The extended sampling included 6 additional sampling days when the wind was blowing toward the base from the SIC to complete the correlation plots for a better representation of historical conditions. Since this could result in an underestimation of long-term exposure conditions and consequently risk, the additional number of sampling days needed to provide additional information for the correlation analysis plots was determined by statistical analysis so that no bias would result by overweighing particular wind directions and overestimating the contribution from the SIC. 2. The health risks calculated based on the 1998 sampling program data are potentially much lower than would be calculated if the winds during the sampling period had been consistent with historical data. This adversely impacts the human health risk assessment because the fundamental assumption of the risk calculations, and any conclusions and recommendations made based on the risk assessment, is that the ambient air concentrations accurately reflect the long-term exposure conditions at NAF Atsugi. In this case, the current ambient air concentrations may underestimate the long-term exposure conditions, and consequently risk, because there were very few periods of southerly winds during the sampling period and therefore few opportunities for

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		emissions from the SIC to have impacted NAF Atsugi. NEHC has revised the report to include this information on a subsection on the departure from the Sampling and QA/QC plan.
Page 11	Another change made to the monitoring program during this period was a short-term mercury study using different sampling and analytical methods.	Since mercury was detected in the ambient samples at concentrations lower than expected, an additional sampling and analytical method that could detect mercuric chloride in addition to elemental mercury was employed for a short-term study to assess the potential for underestimating the ambient mercury concentrations. Results for the additional monitoring efforts are discussed in the Radian air monitoring summary report. NEHC has revised the summary report to include this information.
Page 11	For estimating mean exposures at NAF Atsugi, the inclusion of the final 2 months of samples could bias the results by overweighing particular wind directions and probably, if the targeting was successful, overestimating the contribution of the incinerator complex.	The inclusion of the final 2 months of sampling does not bias the results by overweighing particular wind directions. In fact it helps to account for the seasonal change in wind direction, and to provide the best estimate of long-term exposure conditions, because of the atypical wind conditions found during the 12 months sampling period. An analysis of over 12 years of meteorological data indicated that the predominant wind direction at NAF Atsugi during the summer months (i.e., May – August) is significantly different from the rest of the year. Specifically, the predominant wind direction during the summer months is from the south. The predominant wind direction during the other months of the year is from the north. The seasonal changes in wind direction have a significant impact on human health because the SIC is located south of the base. Therefore, the maximum risk to human health associated with exposure to emissions from the SIC is when the wind is from the south (i.e., when emissions from the

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		SIC are being blown towards the base). Conversely, the minimum risk to human health associated with exposure to emissions from the SIC is when the wind is from the north (i.e., when emissions from the SIC are being blown away from the base). In order to account for the seasonal change in wind direction, and to provide the best estimate of long-term exposure conditions, a 12-month sampling period was selected. Table 1 presents a comparison of the historical wind patterns with the wind patterns observed during the 1998 sampling events. During the months of May – August 1998 there was a 21% decrease in southerly winds (for the SSE-SE vectors) when compared to the 12 years of historical data. The marked decrease in southerly winds greatly increases the uncertainty of any results presented to address the two primary objectives of the sampling program.

Table 1
Percent Difference in Wind Direction
Based on a Comparison of 1998 Sampling Events and the 1985-1997 Historical Wind Patterns for the Same Month

	May	June	July	August
Vector	% Difference	% Difference	% Difference	% Difference
SSE-SE	-26.6%	-31.5%	29.0%	-53.3%
S	-25.8%	-29.9%	-17.4%	-10.9%
SSE-SSW	-11.8%	-17.5%	-14.8%	-21.7%
SSW-SW	-5.4%	26.9%	-33.5%	-40.5%
SE-SW	-18.0%	-13.1%	-14.5%	-27.6%

SSE = South-SouthEast; SE = SouthEast; S = South; SSW = South-SouthWest; SW = SouthWest

Risks calculated based on 12 months data collected in 1998 may not

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		accurately characterize the long-term health risks associated with ambient air at NAF Atsugi, particularly at the Child Development Center, Elementary School, and the Residential Towers, which are locations receiving SSE-SE winds. In other words, the risks may be lower than if the winds had been consistent with the historical data (i.e., individuals would be exposed to emissions from the SIC less often because the wind did not blow emissions from the SIC onto the base). This adversely impacts the human health risk assessment because any conclusions or recommendations made based on the risk assessment may not be representative of historical conditions and could underestimate the actual risks. The decrease in southerly winds also makes it difficult to quantify the contribution of health risk attributed to emissions from the SIC. In order to quantify the contribution of risk attributed to emissions from the SIC, the chemicals in air that are emitted from the SIC must be identified. The method for trying to identify the chemicals in air that are emitted from the SIC is to correlate wind direction, specifically the percentage of time an individual monitoring site was downwind of the SIC, to the chemical concentrations observed in ambient air at the site. The hypothesis is that, for chemicals that are emitted from the SIC, the chemical concentration (and also risk) increases as the percent of time the wind blows emissions from the SIC onto the base increases. The confidence in the correlation of wind direction versus concentration is related to the number of observations that are used to calculate the correlation coefficient and the wind directions that are observed. For the 1998 ambient air data there were few periods of southerly winds to use in the correlation analysis and, therefore, the confidence in the results of the analysis is less than if the winds had been consistent with the historical average. This is particularly true at the Child Development Center, Elementary School, and the Residential Towers. Results for the GEMB suggest that there is a relationship between the

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		concentrations of several chemicals and the wind direction. However, the Child Development Center, and the Elementary School, and the Residential Towers have not been downwind of the SIC often enough to confirm that a similar relationship exists there. If the 12 months sampling had not been extended the result would be that: 1. Fewer chemicals would be identified as having a positive correlation with percent downwind of the SIC and concentration. 2. The confidence in the quantifying the risk attributed to chemicals emitted from the SIC is reduced
	Soil Trend Analyses	
Page 11	Pioneer concluded that no spatial trends for arsenic or BaP were found in the Thiessen Polygon (also called Voronoi diagram) analysis. That conclusion for arsenic appears to be based on the apparent randomness of the values in Figure 4. Closer examination of the figure, however, indicates two possible arsenic-contamination areas: one in the southern area close to the incinerator and one in the northeast area. As shown in Figure D-2, zones along the southern border of NAF Atsugi 100 m from the incinerator at their highest points were estimated to have arsenic concentrations in the highest range (6.7–14.7 mg/kg) for the soil layers 0-3 in deep (0-7.6 cm deep) and 3- 12 in deep (7.6-30.5 cm deep). Those zones are most frequently downwind of the incinerator. Also, the second-highest concentration range (4-6.7 mg/kg) fans out from a west-northwest direction to the northeast direction. The samples from the surface layer, which appear to have been collected in the Tade River valley north of the incinerator, had arsenic concentrations of 0.43-4 mg/kg. Those concentrations are lower than those of the samples on both sides of the valley. That pattern could be the result of erosion in the	NEHC is unclear on reviewer reference to "Figure 4". In order to address the subcommittee's comment we must assume that the reviewer means "northwest" instead of "northeast" for the direction of one of the areas with relatively elevated arsenic concentrations. The report documenting the soil results in question, **Results of March 1998 Soil Sampling, NAF Atsugi** (Radian International, 1998), and which was used by Pioneer to support the Human Health Risk Assessment, states that "arsenic was found at elevated levels near the SIC, but was also found at similar levels in other portions of the base. It appears that the SIC could have affected surface and subsurface soil with respect to arsenic. However, other sources of arsenic appear to be present in other portions of the base" (pg. 4-46). This "other portions of the base" is especially true in the northwest direction from the SIC, near the base boundary (i.e., quite a distance, and over less-affected intervening area). Additionally, the arsenic isoconcentration contouring performed in support of this earlier report showed a small, relatively elevated area of arsenic in surface and subsurface soils a short distance north/northeast from the SIC, and a larger area in the

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	river-valley slopes. In addition, the 3- to 12-in. (7.6 to 30.5-cm) soil-layer map shows the highest arsenic concentrations just north of the incinerator. Those results are consistent with the suggestion that arsenic from the incinerator plume has deposited at NAF Atsugi. However, no objective way to confirm or deny those trends is presented. The possibility of deposition of arsenic should be investigated further and the presence or absence of such a trend should be discussed in the conclusions. .	northwestern portion of the base. Arsenic appears to be naturally elevated across the entire base had arsenic concentrations well above the respective RBCs. The Pioneer report used different interpretive approaches, including the Thiessan Polygon and semi-variogram plots. The Thiessan Polygon approach yielded a similar arsenic distribution pattern to the previous Radian isoconcentration contouring, again showing the highest concentration areas to the immediate north/northeast (close) and northwest (distant) from the SIC. Concerning the reviewer hypothesis about areas immediately north of the incinerator possibly having lower values because of erosion associated with the Tade River valley, the four sample locations responsible for the lower-concentration pattern in this area are some distance from the Tade River. In fact, the more-westerly samples are nearer the river and exhibit relatively higher arsenic concentrations. Also, as stated in Appendix D, pg. 4, "a mathematical model describing the correlation of concentration and distance from the SIC could not be fitted to the semi-variogram of the arsenic data (normal or log transformed). This means that the arsenic data do not exhibit a spatial correlations between concentration and distance." Therefore, based on the various interpretive approaches, although there do appear to be relatively elevated arsenic concentrations in at least one location immediately north of the SIC, there does not appear to be a wide-spread deposition from the SIC similar to other analytes (e.g., total 2,3,78-TCDD TEQs). The merits of additional investigation into arsenic deposition should be weighed heavily against the findings that: 1) the known area of elevated arsenic concentrations immediately north/northeast of the SIC is not near identified areas of concern, 2) this small area of elevated arsenic concentrations is bounded by sample points with lower

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		concentrations (i.e., is already reasonably defined).
Page 12	It is unclear why no data from the Radian phase II soil sampling report (Radian 1999 d) were used in the risk assessment. The data from the Radian phase II soil-sampling report should be used in the risk assessment before such conclusions are made.	As indicated on page 15, section 2.3.1 of the Pioneer report, the Radian Phase II soil sampling was conducted to identify a suitable site specific background soil site which was used to compare with soil concentrations from areas of concern to determine the analytes that should be retained for further evaluation in the risk assessment.
	Missing Toxicity Values	
Page 12	It is inaccurate to characterize all those chemicals as having "no toxicity information". Primary literature and many useful secondary sources should be consulted for toxicity information that could be used in some cases to determine whether exposures to those chemicals at Atsugi might be of concern.	Although the subcommittee later questioned the need for this recommendation during our telephone conference of 10 April 2001 when we requested clarification to their recommendations, NEHC searched the scientific literature for toxicity information to derive screening toxicity values and determine whether exposure to those chemicals at NAF Atsugi might be of concern. The 86 chemicals with no toxicity values were comprehensively researched and analyzed for potential toxicity. An exhaustive search of all available scientific peer-reviewed databases was conducted for applicable toxicological information, including the following book: Gold L. S. and E. Zeiger, Editors. 1997. Handbook of Carcinogenic Potency and Genotoxicity Databases. Boca Raton, FL: CRC Press (also http://potency.berkeley.edu/cpdb.html). The sources of toxicological information consulted, the details of the methodology used for deriving toxicity values for a subset of the 86 chemicals, and the results and conclusions from this analysis are presented in Appendix B and is entitled "NAF Atsugi Toxicological Evaluation".
Page 12	Alternatively, a default cancer slope factor could be used in a Sensitivity Analysis to assess the impact of including in the risk assessment any of the 86 chemicals rated as potential carcinogens on the basis of weight of evidence. For instance, Caldwell et al (1998)	Pioneer identified all chemicals for which toxicity values were available and unavailable. Using a default cancer slope factor to develop a Sensitivity Analysis to assess the impact of including any of the 86 chemicals rated as potential carcinogens on the basis of the weight of evidence may be an

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	used the cancer slope factor of methylene chloride, 7.5 x 10 –3 (kg-day)/mg as a screening value	interesting academic project. Unfortunately funds are not available to develop an exercise in which we question its efficacy because of inherent uncertainties, and that in the end, may not be approved by the scientific community such as the NRC and EPA upon review.
	INTERPRETATION OF RISK ASSESSMENT RESULTS	
	Limitations of the Superfund Methodology	
Page 13	Careful consideration should be given to the characteristics of the exposures that are being estimated and to the derivation of the toxicity values with which the exposure estimates are compared for both the risk assessment itself and the communication of those risks. Estimates of exposure should be presented with ranges or confidence intervals. Appendix A of the NEHC report contains a comparison of the risk-assessment results with the levels at which acute health effects were seen, according to the results of a literature search "to determine potential acute health effects for the specific 24-hour concentrations measured at NAF, Atsugi" (p. 65). The comparison might seem to satisfy the need for an evaluation of acute, possibly reversible effects, but the concentrations measured at NAF Atsugi are compared with toxicity values that were compiled for various purposes and with various protocols. The minimal risk levels (MRLs) and reference exposure levels (RELs), for example, are similar to EPA's RfCs and RfDs, whereas others appear to be more similar to lowest-observed-effect levels. A discussion of how the assumptions and adjustment factors used in the derivation of toxicity values affect the risk assessment should be included in this type of comparison.	In the revised NEHC report we revised Appendix A (now Appendix B) to compare maximum 24-hr concentrations measured at NAF Atsugi with 24-hr studies and/or ATSDR acute (1-14 days) MRLs.
Page 13	Some of the California RELs presented in Appendix A are different from the May 2000 values posted at http://www.oehha.org/air/acute_rels/allAcRELs.html.	The May 2000 California RELs had not yet been posted at the time the Pioneer health risk assessment and NEHC summary drafts reports were completed in January 2000. The updated values have been added to the

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		final NEHC report.
Page 13	Those RELs are based on 1 or 6 hr of exposure and are not appropriate for direct comparison with the "specific 24-hour concentrations measured at NAF Atsugi."	It was not feasible to obtain hourly sampling results required for 1 or 6 hr of exposure by conventional air monitoring because they would be insufficient to achieve detection limits below the risk-based concentrations required for the health risk assessment. Air concentrations were too low to be detected by real time monitoring instruments for a short-term reading. Appendix A (revised as Appendix C) presents not only ATSDR Maximum Risk Levels (MRLs), but also all data that was found in the literature regarding air concentration levels for all chemicals detected at NAF Atsugi. This includes various acute health effect levels for varying periods of time with descriptions of the corresponding effects. In most cases these are occupational levels at much greater concentrations than those measured at Atsugi; however, they are included in Appendix C for comparison purposes with the much lower MRLs. It was more appropriate to compare the maximum 24-hour concentrations to the acute MRLs, since they too are based upon 24-hour exposure time. However, since it was not feasible to obtain 1-hour readings we also compared maximum 24-hour air concentrations of all chemicals with available RELs (based on 1 or 6 hr exposures) and MRLs (based on 1-day to 14 days exposures) to evaluate acute health effects. Although NEHC acknowledges that data qualification needs to be made regarding this comparison, NEHC believes that it is still a useful comparison in the absence of 1-hour data.
Page 13	Similarly, the comparison with intermediate MRLs is not valid, because a 1-day exposure at or near the intermediate MRL is not necessarily a cause of concern.	As stated in the footnote on Table 4-5 of the NEHC draft report, NEHC acknowledges that intermediate MRLs are for 15-364 days of exposure. NEHC also acknowledged in the draft report that since the intermediate MRL applies to 15-364 days of exposure that one out of 70 sampling days does not present a concern. NEHC disagrees with the subcommittee that the comparison with intermediate MRL is not valid. Intermediate MRLs were

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		used for comparison in the event that concentrations above MRLs were identified in more than 15 days of exposure such as in the case of acrolein where the intermediate MRL was exceeded in all 216 sampling days.
Page 14	Because of those concerns with the comparisons in Appendix A, the subcommittee recommends that Appendix A be substantially revised or removed from the NEHC document.	Appendix A has been revised to reflect a more appropriate comparison between estimated exposures at Atsugi and specified reference values. Compounds that do not pose an acute health risk have been screened out. Comparisons that did not allow this have a more detailed discussion of the conclusions that can be made considering the limitations of using toxicity values that were derived for a variety of purposes. Appendix A has been re-designated Appendix C in the revised Human Health Risk Assessment report.
Page 14	The exposure conditions at NAF Atsugi should be kept in mind when one is considering the toxicity of the chemicals present. For example, NEHC discusses the potential health effects of cadmium, but cadmium is a slowly accumulating toxicant that causes adverse effects only after chronic exposure…	The subsection on health effects of various chemicals has been revised in the final NEHC report to account for the exposure conditions at NAF Atsugi.
Page 14	A more appropriate comparison would be between the concentrations of pollutants at NAF Atsugi and the point of departure (the level at which effects are seen, before the addition of uncertainty and modifying factors, in a critical study on which a toxicity value is based). Such a comparison would be similar to the margin-of-exposure analyses recommended by the Presidential/Congressional Commission (1997b). Concentrations of pollutants measured at NAF Atsugi higher than the point of departure would be a cause of concern. The health effects are not clear for concentrations at Atsugi above the RfD but below that point of departure; what action to take in response to such an exposure is the subject of a policy decision, and this should	The NEHC report has been revised to show comparison between the concentration of pollutants at NAF Atsugi and the levels at which acute effects are seen. For those compounds presenting a possible acute health risk, the concentration at NAF Atsugi has been compared to the concentration used in the critical study establishing the toxicity value for that compound, before the addition of uncertainty and modifying factors.

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	be clearly stated.	
	Interpretation of Risk Values	
Page 14	NEHC's interpretation and discussion of risk estimates as though they are bright lines are therefore not appropriate.	The conclusions have been revised in the final NEHC report pointing out the uncertainties that prevent the risk estimates from being considered as brightlines. In addition, in the revised NEHC report, a specific subsection has been added to address policy based versus science-based approaches for evaluating health risk. A summary discussion on policy-based and science–based conclusions and has also been included in the conclusions section
Page 14	NEHC should clarify the nature and history of the regulatory use of 10^{-6} and 10^{-4} cancer risk estimates.	Information on the nature and history of the regulatory use of 10^{-6} and 10^{-4} cancer risk estimates have been included in the revised NEHC report.
Page 14	Similarly, 10^{-4} is not a "cancer risk benchmark", but a value rooted in regulatory decision-making as opposed to medical practice.	In the revised NEHC report, the conclusions regarding the risk have been clarified by distinguishing policy-based from science-based conclusions.
Page 14	Although it is beyond the scope of this subcommittee's task to recommend policy decisions, it does recommend that NEHC clearly differentiate in its report which decisions are based on science and which on policy.	Although risk management recommendations have been removed from the NEHC report, the conclusions regarding risk have been distinguished as those based on policy and those based on science.
	Uncertainty	
Page 15	The report should indicate the amount of uncertainty in the results, at least qualitatively, and should clarify what is meant by the "minimum degree of uncertainty." An adequate discussion of uncertainty should include the sources of uncertainty mentioned in Appendix C of this report.	The subsection on Uncertainty has been expanded in the NEHC revised report.
Page 15	The previous COT report (NRC 1995) made a similar comment on the	The statements have been revised in the final NEHC report.

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	need to convey the uncertainty in risk assessment: "The Navy should be urged to be far more careful in its presentation of risk results. Statements such as that on page 13 of the NEHC (1995) report ("The total cancer risk for carcinogens of 6.62×10^{-3} means that there is an increased risk of 7 cancer cases per 1,000 people over the normal lifetime cancer risk rate") can be misleading. Both cancer and noncancer risks estimated using the methods that NEHC employed are not as certain as such statements imply. To be credible, all risk estimates should be accompanied by descriptions of the assumptions and uncertainties that are associated with them." The present subcommittee reiterates that thought and finds statements like the following (p. 2 of Public Health Summary, NEHC 2000) regarding the risk-assessment results potentially misleading: • The calculated cancer risk for the child resident, less than 6 years of age, indicates that the air quality at NAF Atsugi could result in as much as 1.1 additional cancer cases in a population of 10,000 after an exposure period of approximately 3 years. • The cancer risk for the adult resident is calculated at 3.7 additional cancer cases in a population of 100,000 after an exposure period of 3 years. Those statements imply that after 3 years of exposure cancer could occur (the correct statement requires pointing out that this is the *lifetime* risk of cancer) and does not mention the substantial uncertainty in the estimates (the correct statement requires pointing out that this is an upper-bound risk estimate, with a lower bound of zero). They also fail to discuss appropriately that the increase is small	

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	relative to lifetime cancer risk.	
Page 15	NEHC should consider conducting sensitivity analyses to characterize the uncertainty in the risk assessment as recommended by the National Research Council (1994, 1996) and the *Presidential/-Congressional Commission* (1997b).	No funds are available to conduct a Sensitivity Analysis to characterize uncertainty, an analysis that ultimately may not change the results.
	NEHC's Risk-Reduction Recommendation	
Page 16	One major problem with NEHC's risk-reduction strategies is the lack of planning for or conducting of evaluations of those strategies. Furthermore, Appendix B of the NEHC report shows that some risk-reduction strategies have been implemented before peer review or any assessment of their potential effectiveness. That is not appropriate for a risk-management process.	Risk reduction strategies were previously regarded as acceptable by both of the NRC Committees on Toxicology that reviewed the 1995 and the 1998 screening Health Risk Assessments, without recommending that an effectiveness assessment be done. The risk reduction recommendations are common sense and good Public Health practices. Washing hands after playing in soil and toys that have been outside are preventive measures that can be taken to decrease the risk of exposure to children.
Page 16	Some of the risk-reduction strategies recommended by NEHC are not supported by the findings in the risk-assessment report. For example, the recommendation to continue to monitor health-status indicators is vague and should specify which indicators are to be monitored and why, when they are to be monitored, in whom they are to be monitored, and who will monitor them.	Risk reduction strategies were previously regarded as acceptable by both of the NRC Committees on Toxicology that reviewed the 1995 and the 1998 screening Health Risk Assessments, without recommending that an effectiveness assessment be done. The risk reduction recommendations are common sense and good Public Health practices.
Page 16	The text pertaining to risk reduction is oversimplified. It should discuss how plausible the actions are, whether they can be enforced, and families' compliance with recommendations.	The risk reduction strategies are options that families can take to reduce risk. Compliances with the strategies are strictly up to the individuals. These same recommendations are made everyday in occupational environments and there are no measures for enforcement. The Navy conducted an education campaign to inform parents and individuals on actions they can take to reduce exposure.

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Page 16	Washing of hands, forearms, face, tools, toys, and so on, after outdoor activities that result in direct contact with soil or dust is good advice and practice, but risk reduction by such measures has not been determined (Pioneer 2000; p. 93).	Risk reduction strategies were previously regarded as acceptable by both of the NRC Committees on Toxicology that reviewed the 1995 and the 1998 screening Health Risk Assessments, without recommending that an effectiveness assessment be done. As acknowledged by the subcommittee, the risk reduction recommendations are common sense and good Public Health practices. Washing hands after playing in soil and toys that have been outside are preventive measures that can be taken to decrease the risk of exposure to children.
	INFORMATION GAPS	
	Health Surveillance Data	
Page 16	The subcommittee is aware of studies conducted by Laurel A. May and David Sack at NAF Atsugi and focusing on adverse pregnancy outcomes (including spontaneous abortions) and children's health. Appendix B of the NEHC report mentions the existence of surveillance studies but their design and results should be mentioned in the main section of the NEHC report. The subcommittee recognizes that such surveillance is not a part of traditional risk assessments but believes that it could provide useful, complementary information. Health surveillance of personnel and their families residing at NAF Atsugi is useful for assessing all but chronic effects with latent periods in excess of the period of residence. Because of the rather small number of people at Atsugi, epidemiological methods could attribute only large increases in incidence above background to living at NAF Atsugi. Risk assessment is capable of assessing lifetime risk at low levels. But surveillance of outcomes amenable to this approach can eliminate many of the uncertainties inherent in risk assessment. Therefore, the subcommittee recommends that NEHC use both approaches, especially where data are already available.	While the Navy conducted the comprehensive environmental sampling study at NAF Atsugi, short-term health studies were also conducted to identify certain acute health conditions that either could be associated with exposure to poor air quality or were health conditions that concerned the NAF Atsugi community. One of the studies, the Children's Respiratory Health Effects Study, compares peak respiratory flow between children at Atsugi and Yokosuka. The results of this study showed that there were no significant differences in the respiratory health of children living on or off base at NAF Atsugi and those at Yokosuka. For the measured parameters, children at Atsugi and Yokosuka had values, which are associated with "better lung function" than that of the general population in the United States. The second study, the Pregnancy Outcome Study, compares spontaneous abortion rates between Atsugi residents and residents of other bases in Japan. The results indicated that the Naval Hospital Yokosuka and NAF Atsugi miscarriage rates during the study period were both lower than the reported miscarriage rate for U. S. women with known pregnancies. This

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		rate is between 10% - 15%. Since the military population is generally younger and healthier than that of the U. S. civilian population, we would expect their percentage of pregnancy loss to be lower than the population norms. A medical surveillance on, air pollution related morbidity, compared rates of skin conditions and respiratory symptoms seen at the NAF Atsugi Branch Medical Clinic and Naval Hospital Yokosuka. This medical surveillance has not yet been completed. However, preliminary results show that no significant differences in air quality related morbidity between the adult populations at Atsugi and Yokosuka measured during the surveillance period exist, and that no significant differences in air quality related morbidity between child (below 18 years of age) populations at Atsugi and Yokosuka during this period exist.
Page 17	An evaluation of the health risks that looks at acute, possibly reversible effects, as well as potential chronic effects, could also be useful.	The draft NEHC report did present an evaluation of acute health effects. A discussion on potential chronic health effects has been added to the revised report in the subsection on the health effects of various chemicals that contribute the majority of carcinogenic and non-carcinogenic risks.
Page 17	Stakeholders' concerns should be taken into account when designing surveillance programs.	During a public availability session held in 1997, the NAF Atsugi community voiced concerns, which resulted in developing the epidemiological studies. Medical Surveillance programs have been developed for incoming, current and outgoing military and civilian personnel and their families, such as health pre-screening prior to arriving at NAF Atsugi, development of database specific to document health complaints related to the incinerator such as respiratory conditions and health consultations prior to leaving NAF Atsugi.

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Page 17	NEHC should consider studying the potential health effects of peak contaminant concentrations (for example, correlating contaminant concentrations with anecdotal subjective reports) to assess irritation and other short-term reversible but unpleasant effects.	Children's health studies attempted to correlate potential health effects of peak contaminant concentrations with children's respiratory symptoms complaints, but no clear relationship between wind direction and the levels of gases and dust particles could be identified. The wind was blowing toward the school for only a short period of time during the four-week study period.
Page 17	Surveillance data could be used in conjunction with risk assessment, perhaps focusing the risk assessment on end points of particular interest.	While the Navy conducted the comprehensive environmental sampling study at NAF Atsugi, health studies were also conducted to identify certain acute health conditions that either could be associated with exposure to poor air quality or were health conditions that concerned the NAF Atsugi community. One of the studies, the Children's Respiratory Health Effects Study, compared peak respiratory flow between children at Atsugi and Yokosuka. The second, the Pregnancy Outcome Study, compared spontaneous abortion rates between Atsugi residents and residents of other bases in Japan. An ongoing medical surveillance on air pollution related morbidity is comparing rates of skin conditions and respiratory symptoms seen at the NAF Atsugi Branch Medical Clinic and Naval Hospital Yokosuka. Naval Base Yokosuka served as the control location for the studies for two specific reasons. First, Yokosuka, which is approximately 25 kilometers from Atsugi, is also located on Japan's Kanto Plain. Its population, climate, and vegetation are similar to that at Atsugi. In addition, other than the highly visible point source of pollution at Atsugi i.e., the Shinkampo Incinerator Complex, sources of air quality degradation are similar. Secondly, Yokosuka is the site of the Navy's primary medical treatment facility in Japan, Naval Hospital Yokosuka, which provides access to several healthcare databases.

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		The study on Respiratory Effects in Children had two primary goals: 1. Identify differences in respiratory symptoms and lung function between children who live or go to school at NAF Atsugi and similar children at Yokosuka. 2. Determine if there were more respiratory symptoms in children who live or go to school at NAF Atsugi on days when they are exposed to higher levels of pollutants from the Shinkampo Incinerator during the four week study period (7 May-5 June 1998). The study focused on children since their health is a major concern of the NAF Atsugi residents. Children's lungs also tend to be more sensitive to the effects of air pollution. Fifth and sixth grade students at Atsugi and Yokosuka DOD Schools were eligible to participate. One hundred twenty-seven (127) students volunteered for the study. Eighty (80) of the students lived on base at NAF Atsugi, 17 lived off base at NAF Atsugi and 30 lived at Yokosuka. The children's lung function was tested each school day during lunchtime. Children recorded the number of hours spent outdoors as well as respiratory and/or air quality related symptoms such as, trouble breathing, coughing during the day or night, feeling bad, runny nose, cold, headache, and irritated eyes. A daily symptom score was given to each child based on the information recorded. Data from ambient air monitoring at Shirley Lanham School was also collected for PM10, nitrogen dioxide and sulfur dioxide, known to cause respiratory effects. Wind direction and wind speed were also recorded, in an attempt to associate health effects with environmental pollution conditions. The primary findings of this study were: 1. There were no differences in the respiratory health of children living on

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		or off base at NAF Atsugi and those at Yokosuka. 2. Children living on base at Atsugi reported more runny noses than the Yokosuka children did. 3. All other reports of symptoms were similar. 4. There was no difference in the reported number of colds between the Atsugi on base and the Yokosuka groups. Children living off base at Atsugi did report more colds. 5. Most of the children in the study group had lung function better than that of the general population in the United States. 6. The wind was blowing toward the school for only a short period of time during the four-week study period. As a result, no clear relationship between wind direction and the levels of gases and dust particles could be identified. Complete information on this study can be found in the report Air Pollution From the Shinkampo Incinerator Associated with Adverse Respiratory Effects Among Children at NAF Atsugi Study (NEHC Jul 99). The study on Pregnancy Outcomes was conducted because many residents expressed concerns during the November 1997 NAF Atsugi Public Meeting about the health effects the Shinkampo Incinerator may be having on their families regarding miscarriages. Therefore the study was designed to describe the rate of miscarriage, at NAF Atsugi and other naval facilities in Japan. Information for the study was gathered by looking at hospital and clinic records for past pregnancies. This was a retrospective study where only documented miscarriages versus live births were considered. The study population consisted of Navy personnel or their dependents who were pregnant at some point between June 1995 and May 1998 and lived on or near NAF Atsugi or other naval facilities in Japan serviced by Naval Hospital Yokosuka (NHY). Information used to calculate the miscarriage

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		rates came from three different sources, Delivery Logs and Pathology records at NHY and the Prenatal Log at the Atsugi Branch Medical Clinic Data collection took place during the summer of 1998. It included the number of live births and the number of miscarriages. The total number of pregnancies with known outcomes during the study period was 1862. For the purposes of this study, a miscarriage was defined as an unintentional pregnancy loss at up to the 28th week of pregnancy. Multiple births were excluded from the analysis. The miscarriage rate was defined as the number of miscarriages divided by the total number of pregnancies examined (the number of babies born plus the number of miscarriages). The findings of the study were: 1. The overall miscarriage rate for patients with known pregnancies from Atsugi, Yokosuka, Iwakuni and Sasebo between June 1995 and May 1998 was 7.1%. This rate was determined by review of the delivery log and pathology records at NHY. When the Atsugi patients are subtracted, the miscarriage rate for the other areas is 7.8%. 2. Review of the NAF Atsugi Branch Clinic prenatal log, during the same period, indicates a miscarriage rate at NAF Atsugi, of 8.8%. However, the data used in this study came from different sources and contain some different information. Therefore, the miscarriage rate at NAF Atsugi cannot be directly compared to that of the other naval facilities that were part of this study population. 3. The NHY and NAF Atsugi miscarriage rates during the study period were both lower than the documented rate of miscarriage for women in the United States, who know they are pregnant, which is between 10% - 15%. 4. This study was conducted with the limited information that was available in various records. The results suggested that the risk of miscarriage at NAF Atsugi and other naval facilities within Japan are at the low end of the

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		expected risk range described for the population of the United States. Complete information on this study can be found in the report Pregnancy Loss at NAF Atsugi Japan (June 1995-May 1998) (NEHC Sep 99). A preliminary review of the data collected during medical surveillance on air pollution morbidity period indicated the following: 1. There were no significant differences in air quality related morbidity between the adult populations at Atsugi and Yokosuka during the study period. There were no significant differences in air quality related morbidity between the Child (below 18 years of age) populations at Atsugi and Yokosuka during the study period. 2. There was a peak period of respiratory disease complaints at Atsugi from June –August 1998. This is an artifact of the comprehensive risk communication and health consultation program that was at its height during that period. 3. There was a peak period of respiratory disease complaints at Yokosuka beginning in November 1998 and persisting through January 1999. This represents an outbreak of Japan Type A Influenza during that period. This study, Prospective Analysis of Specific Respiratory Diagnosis Between Atsugi and Yokosuka, is still in progress.
Page 17	A surveillance program could also be helpful in risk-management decisions and in risk communication.	A surveillance program would be warranted if the studies mentioned above had indicated significant differences in health of the populations being compared in the studies.
	Indoor Dust	
Page 17	The Radian report indicates that the purpose of dust monitoring was to "…evaluate the potential for an ingestion route of exposure due to	Dioxins and furans were selected as indicators as to whether contaminants from the SIC were infiltrating or being tracked into homes and therefore to

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	deposited or "tracked–in" dust, surface sampling will be performed once at each of the seven indoor sites whose air will be tested." The NEHC report, however, does not connect the observed results to that stated purpose.	evaluate the potential for an ingestion route of exposure due to deposited or tracked-in dust. The indoor dust and wipe samples were analyzed only for dioxins and furans to maximize the collection of information within the available resources, since they were the chemicals that were most likely to only be related to a burning operation versus other chemicals that could be related to household cleaning, smoking, food odors etc. Given that dioxin concentrations in indoor carpet/floor dust and in the dust on indoor surfaces were available they were used to evaluate dermal/ingestion risk due to deposited or "tracked in dust" in conjunction with soil surrogate concentrations to estimate dermal/ingestion risk for other chemicals infiltrating or being tracked into homes. This information has been added to the NEHC report in the Indoor Air Subsection of Section 2.
Page 17	However, the dust samples were collected by a vacuum method (Micro-Sciences 1999; p. 12) that samples larger particles (greater than 5 μm), so the composition of smaller particles, not larger ones, might be at issue. If the quoted passage was meant to indicate that combustion products can be found in particles smaller than 5 μm (that is was written incorrectly)—and an appreciable fraction of the PM_{10} samples would be of such smaller particles—then a method that collected the particles of the desired sizes should have been used.	To clarify any confusion the text has been revised as follows: The vacuum method actually collects particles smaller than 5 μm. Since no combustion particles were found in this fraction a microscopical analysis was performed on PM_{10} filters that contained particles larger than 5 μm. The results of the analysis of the PM_{10} filters indicated major amounts of charred carbonized fragments that are indicative of a combustion source such as an incinerator. The PM_{10} samples also contained a significant level of fine (sub micrometer-size) carbon particles that are characteristic of vehicle exhaust (e.g. diesel exhaust).
Page 18	The dust samples were analyzed for dioxins and furans, but background apartment concentrations of dioxins and furans are not provided, so the measurements are difficult to interpret.	Background apartment concentrations should be zero or negligible considering that any indoor air concentrations of dioxins and furans would have originated from the ambient air, not from indoor sources.
Page 18	The dust samples should have been analyzed for heavy metals because dust and wipe samples typically are good indicators of air and soil pathways for heavy metals (such as, lead, cadmium, and arsenic).	The subcommittee did not offer an explanation as to why soil is a poor surrogate for indoor dust, but states that " The dust samples should have been analyzed for heavy metals because dust and wipe samples typically are

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	Metals are common constituents of incinerator emissions, and metals can be cheaply and reliably analyzed. Furthermore, the average concentrations of all metals except selenium measured in the soil samples seemed to be higher at the residential towers than at the elementary school or the Child Development Center (see Table 2-6, NEHC 2000); that indicates that the soil might be contaminated by metals. Soil is a poor surrogate for indoor dust, however, and it is important to determine whether the dust is contaminated by metals.	good indicators of air and soil pathways for heavy metals (such as lead, cadmium, and arsenic)." If dust samples are good indicators of air (airborne dust) and soil pathways (tracked in dust) for heavy metals, it is reasonable to use soil as a surrogate for indoor dust as a conservative assumption that will be protective of human health in a health risk assessment. Naturally there are uncertainties associated with this assumption, which were already addressed in the uncertainty section of the Pioneer report and included in the revised version of the NEHC report.
Page 18	In particular, dust samples should have been monitored for lead. Although relatively low lead concentrations were found in the soil, indoor sampling for lead is needed because of the presence of a potential emission source nearby, because lead- contaminated dust is difficult to remove, and because dust is a main source of indoor lead exposure in children up to 4 years old (Manton et al. 2000). Experience at other sites has demonstrated that indoor-dust lead will slowly accumulate if there is a continuous emission source. Table 2-6 (NEHC 2000), which reports data on soil up to 3 in. deep (7.6 cm deep), suggests that lead and other metals might be slowly accumulating around the residential apartment buildings or towers. The average and the RME lead concentrations in soil of that depth are apparently higher at the residential buildings than at the elementary school. Therefore, lead concentrations in dust in the residential buildings could be high.	The indoor dust and wipe samples were analyzed only for dioxins and furans to maximize the collection of information within the available resources, since they were the chemicals that were most likely to only be related to a burning operation versus other chemicals that could be related to household cleaning, smoking, food odors etc. Given that dioxin concentrations in indoor carpet/floor dust and in the dust on indoor surfaces were available they were used to evaluate dermal/ingestion risk due to deposited or "tracked in dust" in conjunction with soil surrogate concentrations to estimate dermal/ingestion risk for other chemicals infiltrating or being tracked into homes. Therefore, although dust samples were not analyzed for lead, the lead risk was still evaluated in indoor air. In addition, as it was stated in page 69 of the NEHC report: "The site-wide RME concentrations of lead in soil and air for NAF Atsugi (i.e., 26.5 mg/kg and 0.39 ug/m^3, respectively) were evaluated using the IEUBK model to determine the potential for health effects associated with exposure to lead. The results of the modeling effort indicated that there is a 0.02% probability of a blood lead level of 10 µg/dL at NAF Atsugi for children. This value is well below the Centers for Disease Control target action level of greater-than-5 % probability. Of the 372 children tested under the Pediatric Lead

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		Poisoning Prevention Program (PLPP) at Atsugi between 1995 – 1999, one child (over 6 years old) who lived on base, was found to have a blood lead between 10 – 19 µg/dL in 1997. But, upon confirmatory blood lead determination the child was found to have a blood lead level of less than 10 ug/dl. Although Table 2-6 may indicate that the lead average and RME concentration in surface soil at the Residential Towers are higher than at the Child Development Center, and Elementary School (28.39 mg/kg versus 13.17 mg/kg and 12.81 mg/kg respectively for average concentrations; 83.55 mg/kg versus 18 mg/kg and 44.14 mg/kg for RME) this does not necessarily indicate that lead and other metal might be slowly accumulating around the Residential Towers. Dioxins also originates from a continuous combustion emission source such as the incinerator and yet as indicated in Table 2-6, the average and RME concentrations for dioxins TEQ for the Residential Towers are the same as in the Elementary School. .
	Other Data Gaps	
Page 18	NEHC states (pp. 4-5) that it could not conduct monitoring off NAF Atsugi, and the Pioneer report (Pioneer 2000; p. 15) states that site-specific background concentrations could not be evaluated, even in ambient air, because all sites on NAF Atsugi were affected by the incinerator complex. No other reason is stated for the failure to evaluate background concentrations. The NEHC report should clearly and specifically describe why off-site monitoring was not possible, even if the reasons are legal or political.	Lengthy discussions on the estimation of background concentrations for ambient air are presented in the Radian Air Monitoring Summary Report, which was submitted to the subcommittee for review. This analysis is fully presented in section 2.6 pages 39-46. These are the reasons why they were not presented in the NEHC and Pioneer reports. Many site-specific factors make the task of separating analytes originating from the SIC from those in background ambient air challenging. For example, NAF Atsugi is located in a heavily industrialized area proximate to multiple point and non-point sources of airborne contaminants. Furthermore, Japan's primary mechanism for disposing of waste is incineration, which results in higher background concentrations of many airborne contaminants such as particulates and dioxins. Meteorological conditions such as low percentage

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		of downwind days makes the task of defining upwind conditions and downwind conditions difficult, whether one is trying to separate upwind days from downwind days for a given location, or trying to define upwind locations and downwind locations on a given day. Offsite monitoring was not possible because not only equipment security regarding vandalism or sabotage could not be guaranteed, but sampling on foreign soil could jeopardize political relations between the U.S. and Japan. As stated in the Pioneer report, background soil concentrations from Phase II soil sampling were used in the soil risk assessment.
Page 18	In addition to US guidelines, NEHC should state what, if any, Japanese standards apply and should provide adequate comparisons with them.	There are few Japanese standards that apply. The only Japanese standards available are those similar to the U.S. NAAQS. There is no specific standard for ozone, however there is a standard for photochemical oxidants, which is lower than the NAQQS standard for ozone. Although there is a standard for solid particulate matter there are no standards for PM_{10} and $PM_{2.5}$. The only Japanese standards that are directly comparable with the U.S. standards are the 8-hour average standard for carbon monoxide, which is higher than the U.S. standard, and the 24-hr average standard for sulfur dioxide, which is lower than the U.S. standard. This information has been included in the revised NEHC report. Since the U.S. Government has raised concerns with the SIC, recently in the past couple of years Japan has promulgated a Dioxin TEQ guideline that ambient air concentrations in Japan may not exceed 0.6 pg/m^3. Japan has also recently adopted a standard for dioxin TEQ in soil of 1000 ppt, which is the same concentration that drives cleanup in the U.S.
Page 18	The 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) toxicity equivalence factors for polychlorinated dibenzodioxins and furans are values agreed on by the scientific community through consensus reports. The latest such consensus report (Van den Berg et al. 1998) updated	The health risk for dioxins and therefore the total risk has been recalculated using the new World Health Organization toxicity equivalence factors recommended by the subcommittee for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) toxicity equivalence factors for polychlorinated dibenzodioxins

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	those values, and NEHC should use the latest values in its risk assessment	and furans.
	SUGGESTED IMPROVEMENTS IN THE PRESENTATION AND ORGANIZATION OF THE NEHC REPORT	
Page 18	The NEHC report lacks a framework that would allow readers to examine what was done, why it was done, and what the results were. The report should begin with a clear statement of the purpose and objectives of the risk assessment.	The NEHC report was developed for the risk managers, with a Public Health Summary section in the beginning of the report for the community who are composed of the military and civilian personnel and their families at NAF Atsugi. This Public Health Summary addressed in simple terms what was done, why it was done and what the bottom line results were. Regarding the purpose and objectives of the risk assessment, more text has been added to the objectives previously stated in all reports (Radian, Pioneer and NEHC) to support better understanding of the purpose and the objectives of the risk assessment.
Page 19	The methods, assumptions, and limitations of the project and its results should be described more thoroughly.	The NEHC report has been extensively revised to include more information on the methods, assumptions, and limitations of the project.
Page 19	The rationales for using or not using particular monitoring techniques and methods and particular analyses are also essential.	NEHC has not included this information in the NEHC report because there aren't many more particular monitoring techniques, methods and particular analysis that are appropriate which could have been used for meeting the objectives of the health risk assessment. The NEHC report does not describe rationale for using the particular monitoring techniques that were used because NEHC believes that the risk managers for whom the report was written, are mostly interested in the results of the risk assessment, rather than rationales for using a particular monitoring technique or speculations on what other techniques could have been used. Most study reports focus on what was done rather than the myriad of things that could have been done.

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Page 19	The NEHC report seems to be a summary of the project, but the audience for the report is not clear. The report is too technical for lay readers but does not provide adequate details for a risk assessor to understand and evaluate the project—planning, sampling, measurement results, or the risk assessment itself. The expected audience of the report should be indicated, and the report should be geared toward that audience.	NEHC has revised the report to emphasize that the NEHC report indeed is a summary of the project, and the audience is the risk managers, who are mainly interested in the results of the health risk assessment and recommendations for risk reduction. The NEHC report was not written for risk assessors. Adequate details for a risk assessor to understand and evaluate the project—planning, sampling, measurement results, or the risk assessment itself are contained in the supporting documentation, i.e. the Pioneer and the Radian reports, which were submitted to the subcommittee for peer review.
Page 19	The NEHC report does not include enough details of the incinerator facility and NAF Atsugi. A paragraph explaining the Enviro-Tech incinerator complex should be added, including information on the number of bypass stacks present and the potential for fugitive emissions from waste and ash handling.	NEHC has revised Section 1 of the NEHC report to include more details of the incinerator facility and NAF Atsugi.
Page 19	The report lacks adequate citations, and it is difficult to evaluate some statements without them. References to specific sections or pages in the extensive supporting documents should be included.	The NEHC report has been extensively revised to include, citations and references to specific sections or pages in the Pioneer and Radian reports.
Page 19	Furthermore, the NEHC risk assessment is based on EPA methods, but the NEHC report and the report by Pioneer Technologies Corporation (Pioneer 2000) do not reference current EPA methods for assessing risks associated with indirect exposure to emissions from combustion (EPA 1998a). Similarly, the EPA Region VI incinerator risk-assessment protocol (EPA 1998b) is not cited or referenced.	Evaluation of risks associated with indirect exposure to emissions from combustion is out of the scope of this health risk assessment project.
Page 19	The subcommittee recommends that the NEHC report be professionally edited. Abbreviations should be spelled out the first	A list of abbreviations and acronyms was included in the draft NEHC report as well as in the Pioneer and Radian reports. Abbreviations were spelled

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	time they are used, and there should be a list of them.	out the first time they were used, and included in a list just before section 1 of the NEHC report.
Page 19	The subcommittee noted some instances of inadequate paraphrasing in the NEHC report of technical discussions and conclusions in the supporting documents. Direct quotation of the wording of contractor reports would be preferable, particularly for technically precise statements. Appendix D presents specific sections of the soil-trend analysis discussion that the subcommittee recommends be quoted directly.	In the revised NEHC report the entire text from supporting documents has been quoted on technical discussions and conclusions instead of paraphrasing.
Page 19	Outdoor air samples appear to have been collected mainly for a period of 24 h, although it is difficult to be sure, because Table 4-5 of the *Final Monitoring Summary* (Radian 2000a) contains an incomplete summary of the sample periods. It is not clear why some samples were collected for more or less than 24 h or why there was a deviation in some cases in measuring from midnight to midnight.	Five regular monitoring runs (Radian Final Monitoring Summary, page 2-3) were conducted during each of the first 12 months of the monitoring program. These "regular" sampling runs were conducted from midnight to midnight. These five runs were always conducted during periods when the incinerator was in operation. The only exception to the midnight-to-midnight sampling protocol occurred during the first six weeks of the monitoring program when some of the dioxin samples were collected for more than 24-hours to ensure that sufficient sample volumes were collected to achieve the desired detection limits. This approach was described on page 4-12 of the Quality Assurance Project Plan (QAPP). Once the laboratory data became available and it was determined that a 24-hour sample was sufficient to achieve desired detection limits, additional dioxin sampling runs were not conducted. In addition to the five "regular" sampling runs conducted each month, an additional sampling run was conducted each month during periods when the incinerator was not operating. These runs were commenced when the incinerator ceased operation, normally at 1600 hours on Sunday, and ran until the incinerator resumed operations on Monday, normally at 1600

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		hours. These times were approximate and were adjusted based on actual incinerator operation. Occasionally this schedule was shifted to a Monday shutdown and Tuesday resumption. Since all "incinerator off" sampling runs were manually initiated, if the incinerator did not shut down, then sample initiation was postponed until the incinerator did shut down. A description of the sampling approach is given in the Radian Final Report (Radian 2000a) on page 2-3. The techniques used would not produce a biased data set.
Page 19	Some essential information (such as sample times and comparison of contaminant concentrations when the incinerator was operating with and without bypass stacks) was not included in the available reports. NEHC should ensure that such information is included in the risk-assessment documents.	NEHC chose not to include information on sample times and comparison of contaminant concentrations when the incinerator was operating with and without bypass stacks in the report. Obtaining this information for the 24 hours of sampling would have been impossible. We were determining the risk based on operating conditions. Considering that the SIC was operated by a foreign entity, operational records that contained this information were not available and the effort involved in reviewing one year of tapes of the plume would not add anything to the risk assessment; particularly since we had no control over the SIC operations.
Page 19	If readers of the report are expected to be varied, it would be helpful to explain the "wind rose" better, that is, that it shows the direction from which the wind is coming, not the direction toward which the wind is going.	An explanation on how to read the wind rose has been included in Section 1 of the revised NEHC report.
Page 19	The $PM_{2.5}$ concentration exceeds the National Ambient Air Quality Standard (NAAQS) and should be discussed.	The possible health effects of PM2.5 exceeding the U.S. health-based standard is discussed in the subsection of the revised report regarding health effects of various chemicals of the revised NEHC report.
	RESPONSIVENESS TO PREVIOUS NATIONAL RESEARCH COUNCIL COMMENTS	

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Page 20	NEHC partially responded to the following problems identified in the previous risk assessments but has not fully resolved them. In the previous report (NEHC 1998), NEHC assumed, without appropriate supporting data, that the concentrations measured at the background site were substantially affected by emissions from the incinerator complex. Better use of meteorologic data to define upwind sites (Radian 2000a, b) has addressed that issue in this risk assessment; however, as discussed in the section on attributable risk, the criteria used to determine the background site are still not clear.	NEHC has addressed the problems identified in the previous screening risk assessments, regarding upwind/background site. In this risk assessment the upwind site addressed in this risk assessment, i.e. the criteria site, was selected based on historical windroses, which indicate the prevalent wind direction from the incinerator toward the base. However, an upwind site selected according to the prevalent wind does not necessarily represent background. As acknowledged by the subcommittee, "because 24-hr sampling was used, a site might be downwind for part of a sampling period and upwind for the remainder of the period." Background is defined as a concentration level that would represent the conditions that could be expected if the SIC did not exist. Background does not mean "pristine" or "unimpacted, but background concentrations reflect anthropogenic sources of airborne contaminants that are located proximate and remote from the SIC. Therefore, to evaluate the SIC attributable risk, meteorological data was used to select the background site (upwind) as one with low percentage of downwind hours, which was compared to a site with a high percentage of downwind hours (downwind) on the same day at the same time. The difference in risk between the upwind and the downwind site indicated the SIC attributable risk.
Page 20	COT previously recommended that continuous or semicontinuous monitoring methods be used to correlate meteorologic data and emission-dispersion estimates with ambient concentrations of pollutants (NRC 1998). Some FTIR monitoring was done (Radian 2000a). The limitations of that monitoring are discussed in the section on attributable risk.	NEHC has addressed the problems identified in the previous screening risk assessments regarding correlation between air sampling and meteorological data. As presented in the draft NEHC report continuous monitoring was conducted to evaluate Criteria Pollutants and twenty-four hour air sampling was used to correlate ambient air concentrations with associated meteorologic data. As acknowledged by the subcommittee, the FTIR was used also as a continuous monitoring device.
Page 20	COT previously indicated that the 6 weeks of sampling is not representative of long-term exposure, and a 12-month sampling	NEHC has addressed sampling that is representative of long-term exposure by sampling over 12 months. The reasons for extending sampling beyond

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	period was recommended (NRC 1998). For the current risk assessment, NEHC performed a 14-month study. The implications of a 14-month, rather than a 12-month, sampling period are discussed earlier in this report.	12 months are explained as follows. Since no stack sampling was permitted to be conducted on this foreign owned incinerator one of the greatest challenges in this project was to determine the SIC contribution to the health risk. One method we used to identify the chemicals in air that are emitted from the SIC was to correlate wind direction, specifically the percentage of time an individual monitoring site was downwind of the SIC, to the chemical concentrations observed in ambient air at the site. The hypothesis is that, for chemicals that are emitted from the SIC, the chemical concentration (and also risk) increases as the percent of time the wind blows emissions from the SIC onto the base increases. In the case of variable wind speed and direction, from one week to the next, if the emissions are constant but the wind speed and direction are not the same, the correlation with percent downwind will be different. The confidence in the correlation of wind direction versus concentration is related to the number of observations that are used to calculate the correlation coefficient and the wind directions that are observed. During the 1998 ambient air sampling study, there were few periods of southerly winds, even fewer than that observed by historical wind roses. As a result, there were relatively few data points to correlate concentrations/percent downwind in an effort to assess SIC contribution. Therefore, sampling was extended for an additional 2 months and samples were collected on days which were predicted to blow from the SIC to NAF Atsugi for a better representation of historical conditions. Six additional days were sampled. The additional number of sampling days needed to provide additional information for the correlation analysis plots was determined by statistical analysis so that no bias would result by overweighing particular wind directions and overestimating the contribution from the SIC. This additional data was collected to reduce the uncertainty on underestimating the risk as a result of sampling on too few days when the winds were from the North. NEHC has added this additional explanation to the revised NEHC report.

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Page 20	As recommended previously by COT (NRC 1998), multiple exposure pathways were explored in the current NEHC risk assessment. Appropriate methods have been used except for the use of outdoor-air concentrations as surrogates for indoor concentrations.	As acknowledged by the subcommittee in this peer review, initially when the sampling plan was developed, the purpose of the indoor air samples was to provide exposure estimates for NAF Atsugi residents and dependents that would be used in the risk assessment. Another purpose of the indoor air sampling was to evaluate indoor air quality at Atsugi by comparing it with indoor air quality in the U.S. However, since the true objective of the risk assessment for indoor air was to calculate risk due to ambient air sources, including the SIC, the ambient air concentrations had to be used as surrogates for indoor air concentrations in the risk assessment because: 1) Concentrations for the majority of the constituents exceeding RBCs were found to be higher indoors than outdoors indicating probable indoor air sources (e.g., insulation, carpets, and household chemicals). If we are trying to determine the risk due to ambient air infiltrating indoors, using indoor air samples that also measure contaminants generated by indoor sources would overestimate the impact of the SIC and other ambient air point and non-point sources 2) Passive ventilation systems are used at most locations which make attempts to quantify the contribution of risk attributable to emissions from the ambient air sources highly uncertain. If we are trying to determine the risk due to ambient air infiltrating indoors, using indoor air samples that also measure contaminants generated by indoor sources would overestimate the impact of the SIC and other ambient air point and non-point sources. 3) Ambient air is the source of constituents in indoor air that are associated with emissions from the SIC and other ambient air sources. Using indoor air samples that also measure contaminants generated by indoor sources would overestimate the impact of the SIC and other ambient air point and

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		non-point sources and would not indicate a risk due to ambient air infiltrating indoors.
Page 20	Other than a brief mention in Appendix B, potential sources of air pollutants near NAF Atsugi, other than the incinerator complex, are not characterized, and their potential contributions to total risk are not evaluated. Such an evaluation would be helpful in differentiating risks attributable to the incinerator from ambient background risks or risks posed by other activities.	NAF Atsugi is located in a heavily industrialized area proximate to multiple point and non-point sources of airborne contaminants. We agree that an understanding of the emissions released from each of the other sources may help in discussing ambient background. However, Japan's primary mechanism for disposing of waste is incineration, which results in higher background concentrations of many airborne contaminants such as particulates and dioxins. Also meteorological conditions such as low percentage of downwind days makes the task of defining upwind conditions and downwind conditions difficult, whether one is trying to separate upwind days from downwind days for a given location, or trying to define upwind locations and downwind locations on a given day.
Page 21	RfCs are still converted to RfDs in the current risk assessment. It was recommended (NRC 1998) that RfCs themselves be used to calculate hazard indexes, and the present subcommittee reiterates that recommendation. Exposures to inhaled pollutants are converted to estimated doses in milligrams per kilogram per day. That conversion is not appropriate for inhaled pollutants with portal-of-entry effects. Therefore, the present subcommittee reiterates the recommendation that exposure concentrations, rather than doses, be used for inhaled pollutants.	The conversion of RfCs to inhalation RfDs is based on the recommendations of the USEPA Superfund Program. While there may be valid technical reasons for not converting RfCs to inhalation RfDs, the reason for the conversion is that RfCs incorporate exposure assumptions [i.e., RfCs are developed based on a lifetime exposure] and therefore can only be used to evaluate one exposure scenario [i.e., continuous exposure over a lifetime]. Inhalation RfDs are calculated from RfCs by dividing by 70 kg (an assumed human body weight), multiplying by 20 m3/day (an assumed human inhalation rate), and adjusting by an appropriate absorption factor (USEPA HEAST 1997 Annual Update). In Superfund risk assessments, multiple exposure scenarios and exposed populations are typically evaluated (e.g., residential adults and children or recreational scenarios) where the exposure assumptions incorporated into the RfC are not appropriate. Because of the need to evaluate risks for many types of NAF Atsugi-specific exposure scenarios (e.g., children and adults with

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		exposure durations less than a lifetime), RfCs and Unit Risks were converted to the RfDs and inhalation cancer slope factors (CSFs). The policy decision of converting RfCs to inhalation RfDs is further explained in the USEPA's Health Effects Assessment Summary Table -- 1997 Annual Update: "Superfund recognizes the importance of these issues [i.e., the uncertainties associated with converting RfCs to inhalation RfDs) and is actively working with EPA's Office of Research and Development to evaluate the impacts of these changes on its program regulations and guidance. In the short-term, however, modification of program regulations and guidance is not a viable option. Therefore, the chairs of the RfD/RfC and CRAVE Work Groups were consulted regarding Superfund's need to make the conversion from a concentration in air to a dose. There was agreement that, in many cases, converting the air concentration data to a dose (in mg/kg-day) may not add significant uncertainty to the Superfund risk assessment process, and therefore may be a reasonable use of the data given appropriate circumstances and Superfund program objectives."
Page 21	The contribution of pollutants from the solid-waste piles and liquid-waste sources at the incinerator facility are not explicitly addressed. Although pollutants from such wastes are presumably measured in the air samples, those wastes do not appear to have been considered as sources in the air-dispersion modeling. They also do not appear to have been considered as potential sources in the computation of the periods when particular sites were downwind.	The comment raises several very valid technical points. Any fugitive emissions from the liquid waste stored at the site, garbage delivered to the site, and incinerator ash stored on the site would certainly have been measured in the air samples collected during the monitoring program. These fugitive emissions, however, were not considered in the modeling for a number of reasons: 1. The garbage piles and waste drum material was constantly changing in consistency, volume, and location within the incinerator complex. 2. There was no way of determining what wastes or constituents were in

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		the piles and/or drums (the facility was permitted to burn municipal, hazardous, and medical wastes) and if they even had measurable emissions (e.g., were the drums tightly sealed or leaking). 3. While estimates were made as to the overall volume (e.g., the number of trucks that entered the facility each day and the estimated volume/mass of each truck) of waste that was delivered each day to the incinerator facility, no effort was made to estimate the number of drums or the volume of the waste pile(s) on any given monitoring day. 4. Overall there was insufficient information on the waste piles and drums to make any assumptions as to the input parameters for the modeling. The modeling assumed that the majority of the emissions from the facility impacting the base would come from the stacks that were nearly at ground level with the base. Therefore, for modeling purposes, we focused on the stacks where we could make educated assumptions regarding input parameters.
Page 21	The 2000 NEHC report still does not provide enough information on the observational design and methods. Some of that information is present in supporting documents (Pioneer 2000; Radian 2000a,b,c,d) and should be included in the NEHC report, but even the supporting documents do not provide all the necessary information.	As indicated in the subcommittee's comment, information on the observational design and methods is found in the Radian and Pioneer supporting documents including the Radian Sampling Plan. The NEHC report did not include as much information as the subcommittee would like NEHC to include because the NEHC report is a summary of the project, and the audience is the risk managers, who are mainly interested in the results of the health risk assessment and recommendations for risk reduction. Additional information has been included in the NEHC revised report to address the specific subcommittee's comments made regarding the need for additional information.
Page 21	Values below the limit of measurement have been replaced by half the limit of measurement in calculating averages. Such replacement might not be appropriate—a sensitivity analysis for the effect of this	Values below the limit of measurement have been replaced by half the limit of measurement in calculating averages because not only is this practice driven by EPA guidelines for handling non-detects, but also because

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	assumption should be performed.	according to a reference cited by the subcommittee (Hornung and Reed 1990), "if there is a compelling reason to report a mean concentration level, Method 2 (L/2) should probably be used". Mean concentrations were necessary to estimate the average health risk.
	APPENDIX A **Objectives of the NEHC Risk Assessment**	
	As discussed previously, the subcommittee noted many different, and sometimes conflicting, objectives within the NEHC report and the supporting documentation from the contractors. In the Pioneer document (Pioneer 2000; p. 1), the purpose of the risk assessment is stated to be: 1. Estimate the potential human health risks to U.S. Navy personnel and their families and other individuals living and working on NAF Atsugi, Japan resulting from exposure to constituents of concern (COCs) in soil, ambient air, indoor air, and indoor dust. 2. Estimate the contribution of the risk attributable to emissions from the SIC. Suitable sampling plans could be designed to help answer both of those questions; however, the data-collection and analysis requirements for each question are different, therefore, both objectives must be considered in sampling design. The purposes of the risk assessment, however, are not consistently incorporated into design objectives throughout the documents. [For example, [Section 1.3 (Radian 1998a), Section 3.1 (Radian 1998c), Section 3.2 (Radian 1998a), Section 3.3 (Radian 1998a), Section 3.4 (Radian 1998a), Section 4.1 (Radian 1998c)]. Those different statements of objectives could imply substantially different approaches. NEHC should ensure that the objectives of each aspect of the risk-assessment project are consistent with the overall project objectives so that sampling is	Both objectives were considered in the sampling design. These objectives were incorporated in the sampling plan protocols designed for risk assessment. Although these objectives were worded somewhat different in different documents they were consistent in developing the sampling design and in the review of the process. In the revised NEHC report NEHC has clarified the objectives to ensure consistency between the NEHC report and all supporting documents. The objectives have been revised as follows: This project was designed to collect data to meet the objectives of the comprehensive health risk assessment which were: 1. Estimate the potential human health risks to U.S. Navy personnel and their families and other individuals living and working on NAF Atsugi, Japan resulting from exposure to constituents of concern (CoCs) in soil, ambient air, indoor air, and indoor dust. This estimate focuses solely on CoCs that are likely to be associated with ambient air emissions and/or subsequent deposition from point and non-point sources impacting the air quality at NAF Atsugi. 2. The contribution of the risk attributable to the Shinkampo Incineration Complex (SIC).

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	conducted to meet the overall objectives.	
	APPENDIX B	
	Air Dispersion Modeling	
Page 23	Although this is potentially an important aspect of the exposure assessment, the NEHC report provides few details of the modeling. The results are summarized in a single paragraph (p. 27) and a map (Fig. 2-2) (NEHC 2000). No information regarding the assumptions, data sources, methods, or intermediate results is presented. .	In the revised NEHC report, the discussion on dispersion modeling has been expanded to provide more details on the modeling.
	General Comments	
Page 24	The dispersion-modeling approach used by Radian International (2000 a,d) might be thought of as a relatively sophisticated means of interpolating and extrapolating, spatially and temporally, measured contaminant concentrations—one that adjusts concentration estimates to account for the impact of meteorologic variables on pollutant transport. For the six contaminants modeled, the estimated concentrations might be better estimates of the exposure potential than the average measured concentrations because modeling was able to take into account meteorologic variation over almost the entire study period.	NEHC did not use air dispersion modeling results to estimate exposure because since only 6 contaminants were modeled the risks would be underestimated.
	Specific Comments	
Page 25	On pp. 27-28 of the NEHC report, the dispersion-modeling results are presented only briefly, and no discussion of the dispersion-modeling method is presented elsewhere in the NEHC report. Therefore, readers of the NEHC report cannot understand the modeling results, their interpretation, and their significance. More details should be included.	In the revised NEHC report, the discussion on dispersion modeling has been expanded to provide more details on the modeling.

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Page 25	The discussion of dispersion modeling on p. 13 of the Pioneer (2000) report should include at least a summary of the assumptions, data sources, and methods.	This discussion on the summary of the assumptions, data sources, and methods has been included in the revised NEHC report. Including air modeling details in the Pioneer risk assessment report would not be appropriate.
Page 25	Page 4-7 of the Radian report (2000a) states that results of a small number of studies indicate that the maximal discrepancies between the values predicted by the Industrial Source Complex-Short Term (ISCST3) model and measured concentrations are generally less than 30% for well-characterized sources. References should be provided for that statement. One validation study using that model gave a correlation coefficient of 0.97 between observed and predicted concentrations of particles at an industry fence line, but that was for long-term estimates (Heron et al. 1984). Correlations for short-term estimates can be much worse than for long-term estimates.	The source shown below generally supports the questioned statement and presents actual data comparisons between ISCST3 and ambient data. The reference for that statement is "U.S Environmental Protection Agency and American Meteorological Society, "Model Evaluation Results for AERMOD," draft document, December 17, 1998."
Page 25	On p. 4-8, the Radian (2000a) report notes that atmospheric stability class was not directly measured and lists it as a source of uncertainty. However, Appendix I states that atmospheric stability class was determined on the basis of solar-radiation and temperature-gradient measurements made on site (Radian 2000d; p.1-3). That method is one of the best for determining stability class-better than the most commonly used approach based on wind speed and cloud cover. Therefore, very little uncertainty would result from that determination.	Atmospheric stability can be estimated by several methods. One common historical method was to use the wind standard deviation, which is a measure of the variability in wind direction. Recently, the U.S. EPA recommended replacing this methodology with a method that uses the incoming solar radiation during the day and the difference in ambient temperature at two elevations (typically 2 and 10 meters) to derive an estimate of atmospheric stability. Otherwise, to directly determine the atmospheric stability, one needs to have access to upper air data to determine mixing height. Upper air data can be obtained through upper air profilers or acoustic sounders or though the use of twice per day balloon launches. These observations were not part of the program scope of work and therefore, the solar radiation/delta

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		temperature (SRDT) method was used. This amounts to using an estimation of atmospheric stability instead of measuring it directly, which may introduce a small degree of uncertainty. Since estimating atmospheric stability is a standard approach, any differences in the modeled outputs between using the SRDT method and using a method based on direct measurement using upper air data should be quite minimal.
Page 25	On p. 4-8 (Radian 2000a), another listed source of uncertainty is the assumption that each of the three incinerator stacks always had equal emission rates. The approach for estimating emission rates on p. 4-6, however, allows calculation of the emission rates separately, as well as lumped together. It might not have been possible to distinguish the impact of one stack from another with the method described, but no rationale for using the lumped approach is given.	Because we did not have any direct information as to actual operating conditions of the various stacks (and consequently the actual emission rates of the various stacks) there is no way of knowing if, or to what degree there are differences in emission rates. Since this information was not available, we had to make some assumptions in the modeling approach, and one of the assumptions was that each stack had equal emission rates. While in reality, this is probably not true, there is no way of knowing otherwise. Therefore, since we had to assume that all stacks had equal emissions, calculating the results separately, or lumped together would have produced the same result.
	APPENDIX C **Uncertainty**	
Page 25	There is inadequate discussion of uncertainty in the NEHC report (2000). The report mentions uncertainty only in the context of saying that it is minimized. It fails to disclose the types or magnitudes of any source of uncertainty and to discuss the impact of uncertainty in the context of the risk-assessment results. The purpose and meaning of "minimum degree of uncertainty" is not clear. Combining this statement with the precise and unqualified estimates of risk in the report, readers might infer that the risk-assessment results are certain. That is not consistent with the limitations of risk assessment in general.	In the NEHC revised report, NEHC has expanded the subsection on Uncertainties to include discussions on the types of uncertainties addressed in the Pioneer report and the magnitude of their impact in the risk assessment results including uncertainties in data collection and evaluation, exposure assessment, toxicity assessment and risk calculations. The use of the term "minimum degree of uncertainty" is related to the numbers, types and length of sampling. Aside from the uncertainties inherent to the risk assessment process, NEHC tried to minimize those elements of uncertainty that we were able to control while working within the limitations placed on this project due to its location. As a result of being a summary report, all the uncertainties addressed in other documents were not incorporated in the

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	Nevertheless, the subcommittee recommends that NEHC characterize the magnitude of uncertainties before and after their minimization and determine their impacts on the results of the risk assessment.	NEHC draft report.
Page 26	A discussion of uncertainty appears on pp. 45-46, but the discussion is not adequate. The text fails to convey the uncertainty surrounding the risks and could result in confusion about risk-assessment methods. For example, it discusses issues related to extrapolation of animal-toxicity data to humans, discusses generic uncertainty issues, and states that "in calculating toxicity values for each chemical, safety factors of 10 to 1,000 are applied to the toxicity values to account for these extrapolations." The sentence apparently is directed at interpreting the application of uncertainty and modifying factors in estimating reference doses and reference concentrations for noncancer health effects, but the complete bases for the safety factors of 10-1,000 and when they are used should be clarified.	As a result of being a summary report, all the uncertainties addressed in other documents were not incorporated in the NEHC draft report. However for the purpose of including additional information, the discussion of uncertainty surrounding the risks has been expanded in the NEHC report. This discussion includes a more detailed explanation on the complete basis for the safety factors.
Page 26	The final paragraph in the section on uncertainties, on p. 46, implies that it is more controversial to evaluate uncertainties than it is not to, and that doing so requires more judgment than is required for a screening risk assessment. The subcommittee disagrees and recommends that the uncertainty in the point estimates of risks presented (such as a statement that actual risks are likely to be somewhere between zero and the upper-bound estimates provided) be more fully characterized and that NEHC reconsider the discussion of the benefits of characterizing uncertainty.	NEHC 's intent in this paragraph was not to imply that it is controversial to evaluate uncertainty, but to note that controversy is inherent to judgment when drawing conclusions regarding the risk. Science points out the uncertainty and judgment analyzes how the uncertainty determines one or more points of risk estimates. This paragraph has been edited and added to an earlier paragraph, which discusses how uncertainties in the characterization of the non-cancer risk should be interpreted.
Page 27	Of those 13 sources of uncertainty, the NEHC report (2000, pp. 45-46) mentions only the last four; the subcommittee believes that other	The subsection on Uncertainty has been expanded in the NEHC report to include all thirteen sources of uncertainty.

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	sources of uncertainty also warrant mention. The criteria used to assign qualitative magnitudes should be provided.	
Page 27	In addition, the magnitude rating of 2 for uncertainty associated with soil, indoor dust, and dermal absorption seems to be high, considering that little of the risk was attributable to those media. Therefore, absorption might not have a "medium" effect on risk estimates, as stated in the supporting document (Pioneer 2000; p. 88).	As explained in the Pioneer report uncertainty associated with indoor dust, can vary within two orders of magnitude because the indoor dust samples were only analyzed for dioxins and furans. Soil concentrations were used as surrogate indoor dust concentrations for all constituents. The uncertainty associated with identification of CoCs in soil was not 2, but 0. The uncertainty associated with dermal absorption can vary within two orders of magnitude because experimentally derived dermal absorption rates were used to evaluate dermal contact with soil.
Page 27	The subcommittee recommends that NEHC state the meanings of "negligible", "small", "medium", and "large" effects on risk calculations.	The meaning of "negligible", "small", "medium", and "large" effects on risk calculations is associated with the number of orders of magnitude the uncertainty impacts the results of the risk assessment. For example, if the degree of the uncertainty varies from 0 to 3 order of magnitude, 0 is negligible, 1 is small, 2 is medium and 3 is large. This has been explained in the Pioneer report.
Page 27	On p. 88 of the Pioneer (2000) report, the column labeled "action or result" in the table is confusing, and it is not clear whether the magnitude classification applies before or after the listed actions have been taken. It is not clear whether those magnitude classifications are related to the uncertainties in the characteristics themselves or to their impact on the overall results.	In the revised Pioneer report clarification has been provided.

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Page 27	Discussion of the exposure assumptions and scenarios should be expanded to convey the variability and uncertainty in exposure estimates. Some uncertainties mentioned elsewhere in the text do not appear in the section on uncertainty. For example, the partitioning of the substances into particulate and gas phases is stated to be uncertain in some places but is not mentioned in the section on uncertainty.	The exposure assumptions and scenarios are fully discussed in the revised NEHC report as well as the uncertainty associated with EPA default assumptions and the site specific factors regarding age, duration and frequency of activity, which have generated the risk estimates for child and adult at the different areas of concern on base and the duration of the exposure for different tour lengths (i.e., 3, 6 years) and individuals living on base for 30 years. The subcommittee refers to partitioning of HCl into particulate and gas phases. This partitioning was mentioned to explain that FTIR sampling detected HCl in vapor phase as opposed to conventional sampling which collected both phases. Particulate and gas phase partitioning does not represent an uncertainty in the risk assessment because both particulates and gas phases were collected with conventional sampling which provided the concentrations used in the risk assessment, not the FTIR.
Page 27	Measurements of particular compounds should be discussed as possible sources of uncertainty. For example, uncertainty might be associated with dioxin measurements (on the basis of the following statement p. 29, NEHC 2000): Maximum detections for dioxins were always found in the samples taken near the fenceline north of the incinerator and at the golf course between the third and fourth holes, east of the incinerator. Elevated dioxin concentrations found at the golf course between the third and fourth holes, east of the incinerator appear to be an anomaly perhaps associated with blowing ash. .	Uncertainty with data collection and evaluation is presented in the NEHC revised report in the Uncertainty subsection. In regard to this specific example cited by the subcommittee, an anomaly on the dioxin concentration on the golf course does not represent an uncertainty associated with dioxin measurements. The anomaly was attributed to blowing ash deposition on the golf course near the incinerator gates, from trucks carrying ash leaving the incinerator complex, not uncertainty with dioxin measurements. The elevated dioxin concentration found at the golf course had a congener profile similar to that found in ash. This profile was different than the congener profile for maximum concentrations in soil from air emission deposition found near the fenceline north of the incinerator. Because this study was designed to support risk management decisions regarding the health risks at NAF Atsugi, it was critical to reduce, as much

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		as possible, the uncertainties regarding data collection and measurements. Most of these uncertainties regarding identification of CoCs present in soil and ambient air at the Base in the sampling methodology were reduced using site-specific information to develop sampling work plan and focus sampling efforts. By collecting samples with sufficiently low detection limits to perform health-based risk analysis; and ensuring that the number and frequency of samples collected was statistically determined it was possible to control the possibility of over- or underestimating the health risks associated with the identification of CoCs in ambient air and soil. The sampling frequency for more than one year guaranteed that each day of the week, as well each week of the year, would be represented to account for any variability due to the day of the week, season, or other temporal effects could be assessed. Some uncertainty associated the identification of CoCs in indoor air and indoor dust could not be minimized since ambient air concentrations were used as surrogate indoor air concentrations for quantitative evaluation in the risk assessment.
Page 27	Because of the interpretation of the hydrogen chloride data, reported concentrations might have been higher than the actual concentrations at NAF Atsugi. FTIR did not detect hydrogen chloride (Radian 2000a; p. 3-3), although, according to conventional measurements, it was expected that FTIR would detect hydrogen chloride. It was assumed that FTIR failed to detect hydrogen chloride because it was in particulate or aerosol form, which would not be detected by FTIR. That assumption is illustrated in the following paragraph (Radian 2000a; p. 3-4) : On seven occasions between January and April 1999, the ambient air monitoring station at the GEMB site reported 24-hour hydrochloric acid concentrations near or above the	The acid gas samples (hydrogen chloride or hydrochloric acid) were collected using an annular denuder. This method works by first pulling the ambient air through a 2.5 micron impactor which removes all particles greater than 2.5 microns. At this point, the air stream can contain fine particulate salts (<2.5 microns), fine aerosols, and of course gas phase HCl. The gas phase HCl is absorbed on one of two glass denuders coated with sodium carbonate, that absorbs the acid gases. Some, but not all, of the aerosol phase HCl will be absorbed on these tubes, but none of the fine particulate phase chloride will be captured here. The final stage of the apparatus is a Teflon filter, which captures the remaining aerosol phase HCl and all of the particulate phase chloride. Each of the three stages were recovered and analyzed separately. Sample

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	FTIR system's minimum detection limit of 7 $\mu g/m^3$. The FTIR system did not detect hydrochloric acid on any of these occasions, and these results were carefully checked. As mentioned in Section 3.1 above, the FTIR only detects chemicals in the form of a gas. Hydrochloric acid in the form of aerosols or particles is not detected. It must be assumed that the hydrochloric acid measured by conventional means on the seven occasions consisted largely of aerosols and particles since the chemical was not detected in the form of a gas by the FTIR system. However, the following is stated about possible interference by other chloride compounds, on the basis of denuder measurements (Radian 2000a; p. 2-14): Therefore, particles captured on the filter should only contain negligible amounts of HCl and HF, but could contain an interferent such as sodium chloride NaCl (metallic chloride salts). Chloride salts on the filter would cause a high bias in the estimate of HCl. In fact, for most of the highest HCl values reported, the major contribution was found on the filter, with much smaller amounts on the denuder sections. Because of the potential presence of interfering chloride salts, the subcommittee believes that some discussion of analytic interference of chloride ion with hydrogen chloride is required; and the assumption that the hydrogen chloride measured with conventional means was from aerosols and particles should be reconsidered.	recovery consisted of rinsing each denuder tube with distilled water and desorbing the filter in distilled water. Each sample was then analyzed by ion chromatography for the fluoride, chloride, and sulfate. Due to chemical kinetics, the chloride found on the denuder tubes could only be HCl and no other chloride salts. However, for the filter samples, the original form of the anion cannot be determined with certainly, because these ions are water soluble, and they disassociate when water extracted and only the chloride (or other anion) determined. At the beginning of the study, it was expected that most of the chloride would be found on the first denuder. Because of the presence of a nearby source of ammonia (pig farm) that could neutralize the HCl by forming ammonium chloride in the atmosphere, it was decided to include chloride results from all three fractions in the calculation of HCl concentration. The final program results show that the chloride on the filter contributed, on average, 30% of the total chloride concentration. The chloride measured on the filter results from chloride salts and aerosol HCl. In cases when the filter fraction represents a substantial portion (>60%) of the overall chloride concentration, the HCl concentration values may be biased high, but we also cannot rule out that the source was the incinerator. In all but one instance, when the filter chloride concentration was high, the site was downwind of the incinerator a significant portion of the time and the upwind concentration of HCl was not elevated (indicating that outside sources of chloride salts were not causing the increased filter chloride concentration). While it is possible that sea salts were causing some of the elevated values, Spengler, et. al. (JAPCA 33, 12:1162-1171, 1983.) found that the majority of chloride salts, either emitted by incinerators or formed by secondary atmospheric reactions, tend to be fine particles while sea-salts and road salts generally reside in a larger fraction. Therefore, the 2.5-

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		micron impactor should have removed the majority of the sea salts. If fine particle phase chloride salts were forming either in the incinerator itself, or due to secondary reaction in the atmosphere, the FTIR could not measure these salts while the denuder could. A number of the highest values resulted from elevated chloride in the particle fraction during periods when the site was downwind of the incinerator a significant portion of the sampling period. Because the corresponding upwind data from these sampling periods did not have elevated particulate phase chloride, long-range transport of chloride salts can be ruled out, and the incinerator must be considered to be the major source.
Page 28	The subcommittee also recommends quantification of "numerous visual observations" (p. 4) and a discussion of the uncertainty relevance of the statement "the eggs and produce may represent a possible source of variation from U.S. background" (p. 45) (NEHC 2000).	Since this is anecdotal information and counting these observations was not part of the scope of this project for determining the risk, it is not possible to quantify numerous visual observations. The statement "the eggs and produce may represent a possible source of variation from U.S. background" (p. 45) (NEHC 2000), has been deleted from the NEHC report.
Page 28	On p. 64, NEHC (2000) states that "there were few days in which these conditions were actually met; therefore, the analysis itself has low power." The subcommittee recommends including a discussion of the uncertainty caused by that fact and of how that uncertainty was factored into the analysis.	A discussion of the uncertainties associated with the upwind vs. downwind analysis has been added to the PIONEER and NEHC Reports.
	APPENDIX D **Soil Trend Analysis**	
Page 28	Although sufficient information on the soil-trend analysis was provided in a Radian report (Radian 1998b), the NEHC risk-assessment report does not provide sufficient information. The subcommittee recommends including more of the details and	More of the details and description provided in the Radian report (1998b) have been included in the NEHC revised report. Additional information on soil sampling for trend analysis, including this paragraph has been added to the revised NEHC report.

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	description provided in the Radian report (1998b), including the following: In the first paragraph on p. 29 of the NEHC report, the second and third sentences should be replaced with the following, based on the Radian report (1998b; p. 1-15): To determine the deposition trends across NAF Atsugi, the base was divided into areas defined by seven radii starting at the Jinkanpo Incineration Complex and extending to the north, with transects at arbitrary distances of less than 300 m, 300-800 m, 800-1,500 m, and greater than 1,500 m from the complex. For trend-analysis purposes, samples were collected from locations where the soil had not been recently disturbed (such as by construction activities). Also, samples were collected, where possible, from areas of potential sediment accumulation, areas of observed vegetation stress, and areas lacking evidence of erosion or ground cover. The narrative in the Radian report (1998b) is more factual and demonstrates that the soil-trend samples were taken in a logical manner.	
Page 28	The second sentence in the second paragraph on p. 29 of the NEHC report should be replaced with the following based on the Radian report (1998b, p. 4-43): It is evident that subsurface soils from the soil trend data set are less	Text replacement has been made in the NEHC revised report.

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	contaminated than the surface soils.	
Page 29	In the second paragraph on p. 29 of the NEHC report, "A definite footprint TEQ's exceeded RBCs" (NEHC uses "RBC" for "risk-based concentrations") should be deleted. The following, based on the Pioneer report (2000; p. 92), should be inserted in its place as a new paragraph: The soil trend analysis indicates a spatial correlation between concentration and distance from the SIC for total 2,3,7,8-TCDD TEQs (see Figure 7-1). Consequently, concentrations of total 2,3,7,8-TCDD TEQs in soil samples on the base typically increase as the distance from the SIC decreases. The soil-trend analysis also indicates that the concentrations of total 2,3,7,8-TCDD TEQs exceeded RBSCs (risk-based screening concentrations) throughout the base for soil samples at up to 3 in. (7.6 cm) and about half the base for soil samples at 3-12 in. (7.6-30.5 cm).	Text replacement has been made in the NEHC revised report.
Page 29	In the second paragraph on p. 29 of the NEHC report, the last sentence should be replaced with the following, based on the Radian report (1998b; p. 4-46): On the basis of the lack of spatial trends, and the generally isolated occurrence of the SVOCs, their presence in soils does not appear to be associated with the Jinkanpo Incineration Complex.	Text replacement has been made in the NEHC revised report.
Page 29	The subcommittee recommends the following: • Reporting averages and ranges of concentrations detected and the RBC in Table 2.6 (NEHC 2000) rather than the RME and average concentration. The geometric mean and geometric	• NEHC has edited Table 2.6 to include more descriptive statistics such as the range of detected values, the range of detection limits for non-detected samples, the median, the mean, and the standard deviation the upper 95% confidence limit.

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	standard deviation (or the 5-95% range of observed or calculated values) should also be included. • Showing the reference areas (background soil areas) on Figure 1-2 in the NEHC report (the figure of the layout at NAF Atsugi). • Showing the wind rose on any plots of the trend-analysis results that NEHC presents	• The reference areas are already shown in figure 2-1 of the NEHC report. • Since the wind rose patterns are variable it would be difficult to select a single wind rose to be placed on these trend analysis plots.
	APPENDIX E **Air Monitoring**	
Page 29	The subcommittee has reviewed the air-monitoring data and quality-assurance audits and has confidence in them. In general, the techniques used for air sampling and meteorologic monitoring appear to be adequate and to represent the state of the art. The subcommittee's main concerns are with the planning, the analysis of the data collected, and the connection between the analysis and the sample-collection strategies. Although the techniques used for air sampling are appropriate, there should be more discussion of the limitations and of possible alternative methods. Some minor comments on the air monitoring are presented below.	Monitoring techniques, methods and particular analysis appropriate for meeting the objectives of the health risk assessment are limited. The NEHC report does not describe rationale for using the particular monitoring techniques that were used because NEHC believes that the risk managers for whom the report was written, are mostly interested in the results of the risk assessment, rather than more discussion of the limitations and of possible alternative methods. More details on planning, including the analysis of the data collected, have been added to the revised NEHC report to help the reader in making the connection between the analysis and the sample-collection strategies
	Comparison with U.S. Cities	
Page 29	The second column in Table 2-2, titled "U.S. Data" (NEHC 2000; p.18), is confusing because it is not stated whether the values are means and, if so, of which cities. If they are means, it is not appropriate to use them as a basis for comparison with the highest or second-highest concentration in the National Ambient Air Quality Standards (NAAQS). It would also be helpful to include the NAAQS in this table.	The "U.S. Data" column has been deleted from Table 2-2 in the revised NEHC report. A column for the NAAQS has been added to this Table.

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	Fourier-Transform Infrared Monitoring	
Page 30	The documentation (such as, Radian 1998d) mentions that open-path FTIR was used at some time but does not clarify when it was used or reports on the results of using it. For example, it is unclear what type of FTIR monitoring is being referred to in the statement that "the FTIR monitoring found high (ppm) levels of hydrogen chloride in the SIC plume exiting the stack" (Radian 1998d; p. 5-5).	The open-path FTIR mentioned in the Radian report refers to the FTIR instrument used in a separate air monitoring project designed for compliance purposes to monitor the stack emissions.
	Other Monitoring	
Page 30	Although the NEHC report does not mention monitoring of the incinerator facility with a video camera or the use of optical pyrometers, a supporting document (Radian 1998a) does (referring to an infrared pyrometer initially and in the equipment inventory). The results obtained with those monitors are almost undocumented in any of the reports.	The pyrometer was initially used for determining whether the incinerator was on or off. Weather conditions deteriorated the pyrometer and could no longer be used. Video cameras were used to monitor the plume for compliance purposes and to verify wind direction if needed.
Page 30	The one documented result is the on-off status of the incinerator, which is recorded for each sample in one of the data files provided to the subcommittee and in Table 2-3 of the Radian report (2000a). In addition to indicating the status for each sample, it would be more appropriate to indicate the status hour by hour to correlate with the continuous air-monitoring data. In addition to indicating the status for each sample, it would be more appropriate to indicate the status hour by hour to correlate with the continuous air-monitoring data.	Reporting the status of the incinerator for each sample hour by hour was not included because it was well known that the incinerator operated 24 hours per day, 6 days a week, Monday through Saturday, and was off on Sundays, except during Japanese Holidays. Therefore during sampling times, the incinerator was either on or off, regardless of the time of the day. The information was kept readily available in case questions arose about specific days of sampling. The effort to review the video tapes hour by hour for 14 months would be extremely labor intensive and unwarranted.
Page 30	How the monitors (camera, pyrometer, and so on) were used to determine on-off status and any uncertainty involved in that determination should also be described. The subcommittee	On and off conditions prior to the use of the pyrometers and after they were discontinued were determined by visual observation for the presence of smoke from the stacks and predictable start time of operations.

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	recommends adding information on how on-off status of the stacks was determined before the optical pyrometer began operating in October 1998 (Radian 1998d, 1999c), including information on the reliability of the method(s).	
Page 30	There did not seem to be any analysis of the time-lapse video records. That is particularly surprising in light of the emphasis in the planning stage on the analysis of the tapes to obtain information on plume behavior and fumigation conditions (Radian International, unpublished data, January 27, 2000, July 1998).	Video cameras were used to monitor the plume for compliance purposes and to verify wind direction if needed. Time-lapse video records were used as evidence for the legal case against the Shinkampo Incinerator Complex by the U.S. Department of Justice. No analysis of the time-lapse video records was made because information on wind direction through plume behavior was not needed for the air monitoring for risk assessment purposes.
Page 30	The comparison of the Atsugi mean contaminant levels with the US mean values in Table 2.5 (NEHC 2000; pp. 25-26) is not valid. The values used for comparison in that table are presented, as US mean values but are not. They represent data collected in a small survey in California or very old exposure estimates reported by Shah and Singh (1988) that are not representative of average US exposures to the substances in question but are averages of all reported indoor-exposure measurements.	NEHC does not agree with the subcommittee that the comparison of the Atsugi mean contaminant levels with the US mean values in Table 2.5 (NEHC 2000; pp. 25-26) is not valid. There are no other studies as comprehensive as the Cal EPA and the studies reported by Shah and Singh on the EPA TEAM studies. Although the Cal EPA study may be limited to homes in California cities and counties, the U.S. TEAM study is an extensive and comprehensive review of numerous papers on indoor air data collected all over the United States. Table 2-5 has been improved. We have replaced the heading "U.S. Mean" with "U.S. Studies Mean" and ensured that the reported results from the TEAM studies include only average concentrations of chemicals found in residential indoor air. This is the best available data found in the literature. The subcommittee made no recommendation of other studies to use for comparison purposes. Since comparison with U.S. data is not an objective of the risk assessment, Table 2-5 has also been moved in the revised NEHC report to Section 4, Health Evaluation to add another perspective to the

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		health evaluation.
	APPENDIX F **Health Risk Assessment** **Human Health Risk Assessment Results**	
Page 30	Without a complete description of the population at risk, however, it is difficult to evaluate the relevance of those exposure scenarios. (For example, are subgroups of the population at greater risk, such as military personnel and their families who have repeated, but nonconsecutive and therefore not limited, tours of duty at NAF Atsugi?)	A subsection in Section 3 has been added to the revised NEHC report to provide better descriptions on populations at risk, such as children in elementary school, tower residents etc. More information from the exposure pathway analysis has also been added to the revised report. The following text has been added to Section 1: "The NAF Atsugi population consists of military personnel and their families who live and work on the facility, civilian personnel, and Navy contractors who work on the facility. Military personnel are typically stationed at NAF Atsugi for 3 years (1 Tour of Duty), however the tour can be extended to 6 years (2 Tours of Duty) or more. The NAF Atsugi population is approximately 7,500 when sailors, residents, and workers are present, of which 81.1% is composed of active duty members and their dependents, 1.22% are Department of Defense employees such as teachers and their dependents, 5.02% are Civil Service employees and their dependents and 12.65% are Master Labor Contractors including Japanese Nationals. Seventy-five percent of the population lives on base and 25% off base. It is estimated that approximately 6,000 are adults. There are approximately 446 dependents under 6 years of age and about 916 dependents between 6 and 18 years old living on base versus 129 and 180 respectively living off-base. The military sailors are typically out to sea for 4.5 months per year. Additional months may also be spent off base as needed (e.g. sailors were deployed to Persian Gulf for 6 months during 1998). Middle school and high school students (12 – 18 years) are

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		bussed daily during school (September – June) to Camp Zama, which is located several miles from the SIC. The normal tour of duty is 3 years, but it can be extended for the same length several times. Some military and or civilian members, particularly those with Asian spouses or Asian backgrounds have chosen to extend the tour many times."
Page 31	Various direct exposure pathways are introduced and discussed. Indirect exposures are not considered, because most food is assumed to be supplied from the United States and the drinking water is assumed not to be contaminated by incinerator fallout. Those assumptions should be better documented with supporting data.	Although this information is provided in the Radian supporting documentation on Exposure Pathways Analysis, the NEHC report has been revised to include information contained in this document and about results of drinking water testing performed routinely on base drinking water. Regarding the food pathway, NEHC, as well as the subcommittee has to believe that food supplied from the U.S. is safe. This is not an unreasonable assumption.
Page 31	In addition, the fact that drinking water is not affected by the incinerator facility does not obviate the assessment of drinking-water contaminants to determine the overall health effects of residing at NAF Atsugi.	Drinking water contaminants have been assessed. Not only the multi-pathway analysis determined that the groundwater pathway was incomplete, but recent drinking water sampling results conducted to ensure that it meets U. S. drinking water standards indicated that the groundwater has not been impacted by incinerator operations (Dames & Moore 1999).
Page 31	As is appropriate, the risks of cancer and noncancer effects are discussed in the NEHC report. It states that the cancer risk for children is "slightly higher" than the EPA benchmark (10^{-4}), as is the risk of noncancer effects. Table 3-2 of the NEHC report indicates that 60% of the exposure scenarios for children have cancer risk estimates that exceed 10^{-4}, compared with 15% of adult exposure scenarios. Higher noncancer-hazard indexes are also observed for children than for adults for every exposure scenario except recreational golfers. The source of the apparently larger risks for children should be clearly identified by NEHC. For example, are the	Throughout the revised NEHC report, sources of larger risks for children are identified, such as physiological, biochemical, and behavioral differences from adults that make children more sensitive to chemical compounds during similar exposure scenarios.

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	differences from adult risks due to higher soil-ingestion rates, breathing rates per unit body weight, and so on?	
Page 31	With respect to the risk of non-cancer effects, the document gives the impression that risk is related largely to respiratory effects and that those effects are reversible, but both impressions might be overstated.	Since compounds contributing to the majority of the non-carcinogenic effects have toxicity studies showing inhalation as the primary route of entry and that acute effects are generally reversible, it is unreasonable to say that these are understatements. This is discussed in the subsection on the health effects of various chemicals of the NEHC report.
Page 31	Several of the chemicals of concern are reported to be reproductive and developmental toxicants; those types of toxicity should be given more consideration.	The revised NEHC report includes more consideration for the reproductive and developmental effects of the chemicals of concern, as discussed in the subsection on the health effects of various chemicals.
Page 31	In addition to listing the hazard index in Table 3-2 (p. 37; NEHC 2000), it would be useful to indicate whether any hazard quotients exceed 1.	NEHC has edited the table to indicate which Hazard Indices exceeded 1.
Page 31	The meaning of notes to Table 3-3 (p. 40; NEHC 2000) is not clear.	Footnotes have been corrected in the revised NEHC report.
	Health Evaluation	
Page 31	Overall, much of this section is repetitive of earlier sections of the report and not central to its stated purpose.	Repetition of earlier sections was necessary as an introduction to the interpretation of the risks; however, the text has been revised to minimize repetition in the revised NEHC report.
Page 31	Basic questions for persons residing at NAF Atsugi are how the incinerator is affecting their health and how certain NEHC is about the effects; for example, "How many studies have been completed on Jinkanpo and who did the studies?" (see "Frequently Asked Questions" in Appendix B, NEHC 2000). Those questions are not	This background information has been added more appropriately to the background subsection in Section 1 of the revised NEHC report, instead of the health evaluation section.

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	adequately answered in the health-evaluation section.	
Page 31	The text pertaining to children's risks (NEHC 2000; p. 55) is vague and superficial and does not consider potentially susceptible populations. Given NEHC's emphasis on using EPA methods, it is surprising that it does not follow EPA's increasing focus on childhood risks.	The revised NEHC report includes an expanded discussion of children's risks in the subsection on considerations for children.
Page 31	NEHC also does not address the potential initiation, exacerbation, or persistence of asthma due to chemical or particle exposures (see reviews by Jones 2000; D'Amato 1999; Goldsmith and Kobzik 1999; Linn and Gong	The effect of chemical or particle exposures on asthma is discussed in the subsections on considerations for children and health effects of various chemicals in the revised NEHC report.
Page 31	The calculated cancer risk estimate is an upper bound on lifetime probability of developing cancer under defined exposure conditions. NEHC uses the RME to estimate an upper bound on the estimates. If a number of upper-bound estimates of exposures are used to estimate risk, then on the basis of simple joint-probability calculations for independent events, the estimated risk will most likely be much higher than the actual risk. The same logic applies to the average-exposure scenario; the probability outcome of multiple mean estimates is unlikely to be an average result and more likely (in these types of risk assessments) to be an upper percentile, depending on the number of separate variables and on details of the distributions. The nature of the cancer risk and exposure scenarios should be taken into account in the risk assessment and its interpretation. An alternative approach would be to use a more sophisticated distributional analysis that could incorporate both individual variability and uncertainty.	As recognized by the subcommittee, NEHC uses the RME to estimate an upper bound on the estimates. The Public Health Summary indicates that the calculated cancer risk fro the child resident (less than 6 years of age) could result in "as much as" 1.1 additional cases of cancer in a population of 10,000. In the conclusions, the risk is addressed as the "reasonable maximum cancer risk." Both indicate that the calculated risk is an "upper bound" risk. Risk exposures are presented in the NEHC and Pioneer reports as separate upper bound estimates for different and independent exposure scenarios. Therefore, since we are not presenting the results as joint probability calculations, there should be no concern about overestimation of the risk beyond the reasonable maximum exposure. A more sophisticated distributional analysis that could incorporate both individual variability and uncertainty would be an interesting academic project. However, no resources are available to conduct such an analysis

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	Cullen and Frey (1999) present more information on that type of analysis.	that although interesting would not add any information that hasn't been already gathered to assist the risk managers in their risk management decisions.
Page 32	The NEHC report (p. 69) suggests that RMEs were used as input into the IEUBK model for this risk assessment, implying the use of 95th percentile upper confidence bounds (UCL95) on the means for air and soil concentrations, and the upper end estimates for other parameters as selected for the RME in the risk assessment; that would not be appropriate. The Pioneer (2000) report, however, suggests that estimates of UCL95 on the means for air and soil concentrations were used as input into the model, and that the IEUBK default values were used for other parameters; these also are not ideal inputs for the model. A preferred approach is to use median estimates for exposure concentrations as point-estimate inputs into the IEUBK. Evaluation of the variability among individuals would require a convolution of the variability distributions for the exposure-point concentrations with the lognormal variability distribution included with the IEUBK to estimate variation among individuals exposed to fixed input concentrations. The subcommittee also notes that the value of 3.9 $\mu g/m^3$ used in the risk assessment (Pioneer 2000) as the UCL95 on the sitewide mean air lead concentration is incorrect by a factor of about 10: the UCL95 on the mean is close to 0.4 $\mu g/m^3$, although the estimate depends somewhat on the assumptions made about the distribution.	The IEUBK model runs have been re-evaluated to ensure that they are correct. There was a typographical error in this section. The site-wide RME lead air concentration should read 0.39 ug/m3 NOT 3.9 ug/m3. Since 0.39 ug/m3 is below the NAAQS value for lead the note will not be added. These upper-bound concentrations were used to provide a conservative estimate of blood-lead levels at NAF Atsugi, Japan. If the mean or median concentrations were evaluated using the IEUBK model then the results would be lower than the RME results – which are below levels of concern.
Page 32	On p. 69, NEHC's discussion of lead measurements states that "this value is well below the Centers for Disease Control and Prevention (CDC) benchmark of greater-than-5 percent probability." The CDC has no such benchmark. As NEHC correctly indicated in the previous	We disagree with the subcommittee on this comment. The EPA and the Center for Disease Control and Prevention (CDC) have determined that childhood blood lead concentrations at or above 10 ug/dl present risks to children's health. ATSDR specifically points out in their health

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	paragraph on p. 69, the 5% probability is a guidance level from EPA.	consultations that this is the level of concern for CDC, and therefore it is a CDC benchmark.
Page 32	Page 54 of the NEHC report states "typically, RfCs are one-thousandth of a NOAEL; therefore, a hazard index of 10 would be acceptable in these cases because there would still be a safety margin of exposure of 100." That statement confuses the basis of uncertainty and modifying factors and of their relationship to the hazard index. Uncertainty and modifying factors are used to extrapolate to safe exposure levels for humans, accounting for uncertainties resulting from differences between studied exposures and possible human exposures. The average human might be ten times more susceptible than the average member of the most susceptible animal species studied; a highly susceptible human might be ten times as sensitive as the average; and human exposure can be ten times higher than the longest exposure observed in the laboratory. Similarly, the term "safety factors" as used by NEHC (p. 54) is not appropriate. It is also unclear whether NEHC is attempting to define a universal value for the hazard index that would correspond to a point where health effects might be expected or to define an acceptably low value of the hazard index to dismiss all concerns about health effects. Clarity is critical to the question of what the overall goal of the risk-assessment project is. Is it attempting to show that there is no problem, or is it attempting to see whether there is a problem?	In this comment, the subcommittee is alluding to a reference mentioned in the NEHC report from the Risk Assessment and Risk Management in Regulatory Decision-Making by The Presidential/Congressional Commission, Volume 2, 1997. The following is the paragraph from this document that NEHC referred to, from the Chapter on Recommendations for Specific Regulatory Agencies and Programs, which evaluated the EPA risk assessment approach for assessing hazardous air pollutant sources to implement section 112 of the Clean Air Act: "The 1990 amendments do not set a threshold for considering health risks other than cancer, which the Commission believes to be a serious omission. We chose a threshold hazard index of 10 because there are few hazardous air pollutants with RfCs that are within a factor of 10 of their no-observed-adverse-effect-levels (NOAELs). Typically, RfCs are one-thousandth of a NOAEL, so a hazard index of 10 in these cases would still leave a margin of exposure of 100. Analogous screening risk assessments that have been performed at Superfund sites might provide useful information about the extent to which screening risk assessments generally identify hazards above and below 10." As illustrated in this paragraph it doesn't appear to be any confusion between the uncertainty factors and their relationship to the hazard index. The safety factor equates to the margin of exposure and not to the uncertainty factors. By making a reference to this paragraph from the Risk Assessment and Risk Management in Regulatory Decision-Making NEHC's intent was just to

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		present the Presidential/Congressional Commission's perspective on their evaluation of the EPA risk assessment approach for assessing hazardous air pollutant sources, not define any values for acceptable Hazard Index.
Page 32	In the first paragraph on p. 75, citations should be added for all the concentrations and locations presented .	Sources of information concerning concentrations of acetaldehyde at various locations in the U.S. have been added to the NEHC revised report.
Page 32	In the second and third paragraphs on p. 75, the information on EPA and the RfC for acetaldehyde is repetitive and contradictory. The RfC given in the second paragraph is incorrect. The correct value is given in the third paragraph.	The subsection on health effects of various chemicals, including information on acetaldehyde, has been revised in the NEHC report.
Page 33	The discussion of acrolein on p. 76 is simplistic and confusing.	The subsection on health effects of various chemicals, including information on acrolein, has been revised in the NEHC report
Page 33	On pp. 69-77, the brief descriptions of the health effects of various chemicals are not clear and do not add to the document. It would be preferable to include an evaluation that incorporates known and suspected adverse human health effects.	The subsection on health effects of various chemicals has been revised and includes a discussion of known and suspected adverse human health effects for each compound that contributes to the majority of carcinogenic and non-carcinogenic risks.
	Pioneer Risk Assessment Document	
Page 33	On p. 7 of the Pioneer (2000) report, it is stated that hole 9 of the golf course "frequently receives emissions from the incinerator stacks." However, the wind rose indicates that the wind is from west, west-southwest, or west-northwest about 2.7% of the time (average, about 10 d/yr).	This statement has been revised in the PIONEER report to read "Hole 9 is closest to the SIC and occasionally receives emissions from the incinerator stacks."
Page 33	The statement on p. 8 of the Pioneer (2000) report that "these assessments do not address risks from other sources of exposure (e.g.,	Lack of clarity in stating the objectives of the risk assessment has led the subcommittee to believe that the objective of the risk assessment is to

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	dietary exposures) or risks from other constituents that are not associated with the site under evaluation" is also not consistent with the first objective of estimating the potential human health risks at NAF Atsugi.	estimate the potential human health risk resulting from living at NAF Atsugi and not just the risk related to the incinerator. As clarified in the revised NEHC and supporting documents, the objective is to estimate the potential total human health risk at NAF Atsugi resulting from exposure to constituents of concern (CoCs) in soil, ambient air, indoor air, and indoor dust, focusing solely on CoCs that are likely to be associated with ambient air emissions and/or subsequent deposition from point and non-point sources impacting the air quality at NAF Atsugi. With this clarification it is easier to understand that, as indicated in the NEHC and Pioneer reports, dietary exposure was not considered a pathway because food consumed by the base population comes from the U.S. and not from locations near the incinerator.
Page 33	On p. 12 of the Pioneer (2000) report, it is stated that a 0- to 3-in. deep (0-7.6 cm deep) soil sample was used "because it is representative of the portion of the soil column that most people routinely contact." However, people do not routinely come into contact with soil below the surface layer down to a depth of 3 in. (7.6 cm). Soil samples up to 3 in. (7.6 cm) deep might provide the closest available surrogate for the soils that people actually come into contact with. In some circumstances (such as longer exposures), if there is sufficient mixing of surface soil through this depth range for the concentrations in the entire depth range to be of relevance, those soil samples might be appropriate. Discussion of the potential mixing rate of surface soils, its effect on the soil-contact scenario, and the collection of surface-only samples (the top millimeter or so) should be considered in the planning of future studies.	The PIONEER report has been revised to state: "Soil depth is an important consideration because airborne COPCs are deposited on the surface of the soil. They can migrate deeper into the soil by mixing, tilling, digging, or, to a limited extent, natural processes. COPC concentrations in soil generally decrease with depth – due to dilution resulting from mixing with clean soil. Therefore, collecting a soil sample deeper than humans will come in contact with may underestimate the risks by diluting the sample, and collecting a soil sample at a shallower depth than people regularly come in contact with may overestimate the risks. The samples collected from 0 to 3 inches were evaluated in the risk assessment. This depth interval was selected because it is representative of the portion of the soil column that most people routinely contact." Additionally, the Agency for Toxic Substances and Disease Registry (ATSDR) from the U.S. Public Health Service has defined surface soil as the top 3 inches.

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Page 33	As discussed on p. 14 of the Pioneer (2000) report, duplicate field results are treated as independent observations when calculating summary statistics and exposure-point concentration estimates. Such treatment doubles the weight placed on the concentration at a single place and time, and is not appropriate. Field or laboratory duplicates should be averaged before summary statistics are calculated.	The statement in the Pioneer report has been revised. Duplicate air samples were only collected at the GEMB for all chemical groups except for mercury, which was collected at every site. For ambient air sampling, duplicates were used to determine precision of sampling and they were not included in the determination of exposure concentrations. Therefore there was no double weight treatment placed on the concentration at a single place and time. Duplicate soil samples were collected at every area of concern and used as discreet samples. However, since the risk contribution was 95% from air, double weighing caused by the use of duplicates as discreet samples does not contribute to a significant change in the total risk.
Page 33	NEHC should include a justification for the use of the QL/2 method to strengthen the discussion of the risk assessment with mean concentrations.	The PIONEER report has been revised to state: "Per USEPA Risk Assessment Guidance for Superfund, if a constituent was detected in a sample, then one-half the sample quantitation limit was substituted as the concentration for all of the non-detected values when calculating exposure point concentrations (U.S. EPA, 1989)."
Page 33	Page 14 of the Pioneer (2000) report mentions a procedure called "Compound Rules of Decision". The procedure is neither described nor referenced, and it is not stated whether the circumstances under which it is supposed to be invoked ever occurred in the risk assessment. Some description of the procedure, the specific circumstances under which it was invoked in this risk assessment, and a citation should be included.	The steps in the CROP decision rule have more clearly described in the revised report. In instances where analytical overlap occurred (i.e., results for a constituent were reported by different analytical methods for the same sample), a set of decision rules, called Compound Rules of Precedence (CROP), was applied to the data to select the concentration that should be used for risk assessment purposes (i.e., development of exposure point concentrations). CROP prioritizes the selection based on the sensitivity of the analytical methods involved in the overlap. However, other factors, such as the whether or not the analyte was positively detected by both methods, are also considered. The CROP rules used to reduce the analytical data and develop

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		the exposure point concentrations presented in Section 2.5 are described below. Analytical overlap was identified only in ambient air data for constituents in the following methods: 1. Gas Chromatography/Mass Spectroscopy (GC/MS; EPA Method TO-15) [CROP Level of Precedence: 1] and Semi-Volatile Organic Compound (SVOC; SW8270) [CROP Level of Precedence: 2] 2. GC/MS (EPA Method TO-15) [CROP Level of Precedence: 1] and Aldehydes/Ketones (EPA Method TO-11) [CROP Level of Precedence: 2] 3. Mercury (Gold foil amalgamation) [CROP Level of Precedence: 1] and Hopcolite-Resin Mercury [CROP Level of Precedence: 2] A conditional level or precedence was used so that results with a higher level of precedence (indicated by the lower number) were used to develop EPCs in all cases except in instances where the result of a constituent with a higher level of precedence was not detected and the result for the lower level of precedence was detected. In these instances the lower level of precedence result was used to develop the EPC.
Page 33	Section 2.3 (Pioneer 2000; p. 15) describes the initial screening of chemicals of concern (COCs). Such a screening, if carried out as stated, would prevent the risk assessment from addressing its first objective, because the overall risks of the site would include those due to background concentrations. It appears that the screening was carried out for the soil measurement but not for the air measurements.	Since we have further clarified that our objectives only relate to impacts from ambient air only, background soil screening is appropriate and it fits the objective because we are screening for chemicals normally found in soil, not in air.

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	The implications of that should be discussed.	
Page 34	On p. 16 (Pioneer 2000), the descriptions of the calculation of the UCL95 estimates of mean concentration are not clear for any distribution, an estimate of the UCL95 of the mean is required. How a distribution is tested for normality or lognormality is not specified, nor are the criteria applied to the results of any such test. If the distribution is neither normal nor lognormal, further analysis might be desirable before an approach based on normality is accepted. The description is also inadequate in that the estimates adopted for the UCL95 of the mean are not given. Many estimation procedures are available (such as, analytic estimates based on the t-distribution for normals and on Land's procedure for lognormals, minimum variance unbiased estimates, likelihood-based estimates, and bootstrap and jackknife estimates applied to any of these or others), and the procedure used should be stated.	The PIONEER Report was revised to state: "Analytical data summary statistics for each AOC, media, and constituent are presented in Appendix A. The exposure point concentrations calculated for this assessment are presented in Appendix B. The underlying distribution for each COC was determined using either the Shapiro-Wilk test (in cases when there were less than 50 data points) or D'Agostino's test (when there were more than 50 data points). The alpha level for each test was 0.05. Results identified in Appendix A as "Unknown" mean that the distribution is not normal or lognormal at the 0.05 significance level." Also, a new section on Statistical Formulas use to calculate summary statistics was added to Section 2 of the PIONEER Report.
Page 34	Page 22 (Pioneer 2000) describes the term MF (defined by Pioneer as exposure-pathway- and constituent-specific modifying factors, such as percutaneous absorption rate) in the first equation is described as having "variable units". With the definitions given for the other variables in the equations, MF is dimensionless.	The units for MF have been changed to read "MF = Exposure Pathway and Constituent Specific Modifying Factors (e.g., percutaneous absorption rate) (unitless, unless the units of C or HIF vary from units listed above)."
Page 34	Page 22 (Pioneer 2000), has the following explanation of how the exposure parameters were chosen for the RME case: Each variable in this equation has a range of possible values associated with it. The intake variable values for a given pathway are selected so that the combination of all intake variables results in a realistic upper bound estimate (or RME) of	For the purposes of this risk assessment, the Navy decided that it was important to clearly evaluate the impact of the exposure point concentrations on the risk assessment. Therefore, all of the exposure assumptions, except the exposure point concentrations, and the toxicity values used to calculate the risks were consistent between the average and RME cases. Consequently, the Navy can directly compare the long-term average and long-term upper bound risks when making risk management

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	the possible exposure by that pathway. The same values, however, were used for the average case. In the risk assessment, the average case appears to use RME estimates for all exposure parameters except the exposure-point concentration, where the difference between average and RME cases is the difference between an estimate of mean concentration and a UCL95 on the mean concentration (see, for example, Tables 3-2 through 3-6, particularly their footnote c). That is not the usual meaning of average for such exposure scenarios and is misleading. The typical approach for estimating an average or central-tendency case is to obtain an average for the whole population that is exposed by using exposure parameters that represent central-tendency values (such as means or medians). The ranges or confidence limits around the central-tendency values should also be presented.	decisions. This approach may not be considered "typical" but it does provide the Navy with information regarding the range of risks at NAF Atsugi, Japan.
Page 34	In Table 3-2, footnoted confuses the "fraction from contaminated source" with "outdoor and indoor exposure to soils". Although those concepts might overlap in some circumstances, they are distinct and do not overlap in this case. The formula presented appears to have been adapted in such a way that the "fraction from a contaminated source" represents the "fraction of time indoors". The explanation in the table should explain that better.	The Text and footnote in Table 3-2 has been revised and the FI now reads "Fraction of ingested soil/dust from outdoor source."
Page 34	In Table 3-3 (p. 23), footnote e does not explain how 150 mg/d is "the midpoint" between 50 and 200 mg/day.	The footnote has been revised to read "Based on professional judgment, the adolescent incidental soil ingestion rate was chosen as the midpoint between the residential child and adult values (i.e., 200 mg/day and 100 mg/day). It was assumed that an adolescent would potentially receive more soil contact than an adult, but that this contact was likely to be less than a child under age 6."

NEHC RESPONSES TO COMMENTS FROM THE "REVIEW OF US NAVY'S HUMAN HEALTH RISK ASSESSMENT OF THE NAVAL AIR FACILITY AT ATSUGI, JAPAN BY THE SUBCOMMITTEE ON TOXICOLOGY, NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES

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Page 34	Pages 33 and 68 (Pioneer 2000) mention an inhalation RfD, the second time in the context of EPA's IRIS database. That RfD was probably derived from an RfC. The term "inhalation RfD," however, is not used by EPA and is confusing.	A note stating the inhalation RfDs were derived from RfCs was added to the report.
Page 34	Page 84-85 (Pioneer 2000), in the context of a comparison between the golf-course site and the GEMB site, states that "the only difference between the airborne concentrations, and consequently risk, at the GEMB and the airborne concentrations at the Golf Course should be emissions associated with the SIC." That would be correct only if the "Background + Other Point and Non-Point Sources (emissions)" affect the two sites equally. That hypothesis was not established or tested at any point in the project.	This section of the revised PIONEER report has been updated to present more detailed information on the "Upwind vs. Downwind" analysis. A formal test of the hypothesis that the only difference between airborne concentrations at the GEMB are emissions from the SIC (i.e., "Background + Other Point and Non-Point Sources (emissions)" affect the GEMB and Golf Course equally) was not performed as part of this assessment. However, the total risks, and the risks calculated for the vast majority of analytes assessed in the "Upwind vs. Downwind" analysis, support the hypothesis.
Page 34	On pp. 84-85 (Pioneer 2000), the methods adopted for the comparison between the golf-course and GEMB sites are not adequately explained. For example, there is no information in the documentation as to which particular days were used for the comparison. Even if the days were correctly selected, the results presented in Table 5-10 cannot be interpreted without further information on the method because some approaches to producing such values are statistically invalid.	In the revised PIONEER report the analytical data for the days evaluated in the Upwind vs. Downwind Analysis are presented in Appendix D. Also, the summary statistics for the Upwind vs. Downwind Analysis are presented in Tables A-10 and A-11 of Appendix A of the PIONEER 2000 Report.
Page 35	The committee can conceive of several ways of generating the values in Table 5-10. 1. Take the concentrations measured at each site for each chemical on the selected days, and find the average and an upper 95th percentile estimate on that average for the concentration of each	In an earlier section of their peer review document the subcommittee disagreed with NEHC's upwind downwind approach to determine the risk contribution from the incinerator and recommended using dispersion modeling combined with correlation/regression analysis. The approach recommended in this comment is different than the dispersion modeling

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	chemical at each site. Calculate an "average" and "RME" risk estimate for each site on the basis of the two sets of concentration estimates. The entries in Table 5-10 could then be the differences between sites. Although the "average" estimate so generated for a site is meaningful, the "RME" site differences so obtained have no statistically valid meaning. This method appears to be the closest approximation to what was meant by "RME" in the rest of the document; but the differences between such "RME" values cannot be interpreted. 2. Take the concentrations measured at each site for each chemical on the selected days, calculate day-by-day concentration differences for each chemical, and compute the average of these differences in daily concentrations for each chemical over all days selected and upper 95th percentiles on such average differences. Calculate the risk estimate differences for Table 5-10 on the basis of the two measures ("average" and "RME") of concentration differences. The "average" so obtained will be the same as for approach 1, but the "RME" value will be different and will have no statistically valid meaning. 3. For each selected day, calculate at each site a risk-weighted sum of concentrations of all the chemicals in question, selecting the risk weighting so that summing over all days would give a risk estimate (roughly speaking, a risk estimate for that day for that site). Take the difference between the values for each site to obtain a series of daily risk-weighted differences. Obtain the sum and the upper 95th percentile estimate on the sum of the risk-weighted differences as "average" and "RME" estimates. The "average" value so obtained will be the same as approaches 1 and 2, but the "RME" will be a statistically valid estimate that can be interpreted. The statistical uncertainty associated with the "average" column in	approach. It uses the NEHC's upwind downwind approach, but recommends a different way of calculating the average and the RME concentrations for the upwind and the downwind locations. To obtain clarification on which approach would be the preferred approach, NEHC sent a written request to the subcommittee for instructions on how to use either approach. The subcommittee chose not to reply to our request for instructions in writing, but in a phone conference that included only two members of the subcommittee (perhaps the reviewers that provided the initial recommendation). During the phone conference, the two reviewers withdrew their recommendation to use a dispersion modeling approach and did not articulate instructions for neither approach. Instead they recommended a third approach, but indicated that they could not ensure that the approach would provide valid results. As the subcommittee admits that the third approach includes just as much uncertainty as the NEHC approach, NEHC chose to retain the approach that was initially presented to the subcommittee for review. The approach used by NEHC was actually the approach recommended by the previous Committee on Toxicology that reviewed the 1998 screening risk assessment and stated the following: "Another approach that might be useful for getting a rough estimate of the contribution of incinerator emissions to ambient air, relative to the background, would be to compare results from Location 1 (upwind site) with those from downwind locations on days when the wind direction is out of the south-southwest and relatively constant."

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	Table 5-10 is not presented—the differences might not be statistically distinguishable from zero. The third of the approaches just summarized provides a series of daily values that would allow calculation of statistics on differences between sites, including the statistical significance of such differences. In contrast, the first and second approaches (and many other possible ones) cannot provide such information. In any case, the values in Table 5-10 cannot be used to draw unequivocal conclusions about the contribution of the incinerator without an evaluation of the hypothesis that there is no difference in the absence of the incinerator. Moreover, such values as those in the table would allow an estimate only of the contribution of the incinerator to the differences between the GEMB and golf-course sites, not of the average contribution to actual populations or individuals.	
Page 35	It is pointed out on pp. 85-86 (Pioneer 2000) that the majority of the hazard-index estimates is contributed by acetaldehyde, acetonitrile, acrolein, and PM_{10}, but it is not pointed out that of those major contributors, only PM_{10} could be associated with incinerator emissions in the analyses presented. The "upwind" hazard index or risk estimate is higher than the "downwind" for several chemicals in Tables 5-11 and 5-12; that situation would not be possible (except for the inherent uncertainties) if the hypothesis that there are no differences in the absence of the incinerator is correct. Although such effects could be due to the uncertainties involved, the uncertainties are not discussed.	A discussion of the uncertainties associated with the "Upwind vs. Downwind" Evaluation has been added to the revised PIONEER report. The comment that "only PM_{10} could be associated with the incinerator" is not correct. PM_{10} was identified in the correlation analysis performed by Radian as being associated with the incinerator. However, the correlation analysis only identified 6 analytes (i.e., hydrochloric acid, dioxin 2,3,7,8-TCDD-TEQ, lead, cadmium, arsenic, and PM10) as having a statistically significant relationship between concentration and percentage downwind of the SIC. The rationale for the decision to use the Upwind vs. Downwind method was based on experience from previous risk assessments performed on municipal waste incinerators that indicate that multiple chemicals (i.e., 50 – 100s), some of which are highly toxic, are likely being emitted from the SIC (USEPA, 1998a). There are uncertainties with the Upwind vs. Downwind (primarily associated with the small sample size) approach, which are demonstrated by the fact that a few analytes have risks higher at

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		the upwind site rather than the downwind site. However, the risks for most analytes were higher at the downwind site that the upwind site and the total risks were significantly higher at the downwind site than the upwind site – which is consistent with the hypothesis that formed the basis of the Upwind vs. Downwind evaluation.
Page 36	The recommendations section of the Pioneer risk-assessment document (Pioneer 2000) contains many recommendations that are not based on the findings and conclusions presented in the report. The primary recommendation (recommendation 1, p. 92) mentions specific periods (32 and 98 months) that are not mentioned in the report.	Risk Management recommendations have been deleted from both the NEHC and the PIONEER reports. The majority of the recommendations previously stated in the NEHC and Pioneer reports were based on the level of concern that the Navy and EPA would have in the U.S. that would trigger policy actions to protect our military and civilian personnel. They were common sense administrative and public health practices. Findings and conclusions in the NEHC report address the calculated cancer risk by EPA methodology, based on policy. The reasonable maximum cancer risk for children who are residents at the base for one tour of duty (36 months) is 1.1×10^{-4}. Therefore to reduce the cancer risk level to 1×10^{-4} the recommended tour length should be 32 months for children and 98 months for adults. Although NEHC is well aware that the calculated risk is not an exact number because of the uncertainties associated with the risk assessment process, in the U.S. this is a level of concern that either would shut down an incinerator such as the Shinkampo incinerator complex and any other sources of air pollution, or cause action to be taken to reduce emissions. Since the U.S. government depends on the Government of Japan to enforce their environmental regulations regarding uncontrolled incinerator emissions, the easiest way to protect U.S. citizens was to recommend shorter exposure duration by decreasing the tour lengths to reduce risk levels to less than 10^{-4} for children and adults.

Question 3. Why did the Navy wait so many years before acting against the SIC operation?

Response. The incinerator operation was located outside the fence line of NAF Atsugi on the sovereign territory of the host Nation. The operation began as a small burn pit and grew to a full scale incinerator over the years. The Navy was very proactive and began monitoring plant operations and air sampling as early as September 1988, followed by the conduct of the Navy Medicine Comprehensive Health Risk Assessment . The Navy shared the data with the GoJ via USFJ, and pursued solutions through the Host government at the highest levels of DOD, the State Department, and other official channels [Justice Department] until the GoJ finally took action on the issue and the operation was subsequently closed in 2001.

Question 4. On what date did the Navy require SF600s to be placed in servicemembers' medical records?

Response. Beginning in March 1996 and ending sometime after the incinerator was shut down in May 2001, several different SF600s were developed for inclusion in medical records of individuals assigned to Naval Air Facility Atsugi.

• The first SF 600 developed, listed the maximum sampling concentrations measured in 1994 for 12 chemicals exceeding USEPA or New York State ambient air quality standards during the air quality study conducted by Naval Facility Engineering Services Center. Cancer risks were also provided on this SF600. Beginning 1 March 1996, this SF 600 was inserted in medical records of all individuals that requested the documentation.

• In February 1998, BUMED sent an Administrative Message regarding overseas screening for NAF Atsugi Japan indicating "Effective immediately, for all family members being screened for overseas assignment for NAF Atsugi, place an overprinted SF600 articulating the situation in the individuals health records text for the SF600 follows: "To be retained permanently in the health record. This SF600 is to document full disclosure of potential environmental exposures for all personnel and their families who are assigned to NAF Atsugi. Authority: Chief BUMED 262200ZFebruary 98.

• In May 1998, Commander in Chief, U.S. Pacific Fleet sent an Administrative Message regarding "Risk Communication and Health Consultation Plan for Naval Activities Onboard Naval Air Facility Atsugi Japan." The message addressed the implementation of a Comprehensive Risk Communication and Health Consultation Plan.

• In July 1998, BUMED sent an updated Administrative Message regarding overseas screening for NAF Atsugi Japan to address this "Detailed Comprehensive Risk Communication and Health Consultation Plan for NAF Atsugi."

The comprehensive health risk communication and consultation at NAF Atsugi began in June 1998. A revised SF 600 was developed to be permanently retained in the medical records for every individual at NAF Atsugi and those with orders to NAF Atsugi. The purpose of the SF600 was to document potential exposures and possible health effects, related to environmental conditions, for each military member and/or family member based upon their medical history. An SF600 overprint was to be completed at the time of the member's Departure Health Consultation to document the history on where servicemembers and family members lived, worked, or attended school or day care while at NAF Atsugi.

RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY HON. RICHARD BURR TO PAUL B. GILLOOLY, PH.D., CAPT, MSC, USN (RET.), PUBLIC HEALTH ASSESSOR, NAVY MARINE CORPS PUBLIC HEALTH CENTER

Question 1. The Shinkampo Incineration Complex operated near Naval Air Facility (NAF) Atsugi from 1985 to 2001.

A. During that time, were there any recommendations made within the Navy to relocate military families stationed at Atsugi?

B. If any such recommendation was made, where did the recommendation originate in the Navy and what was the final disposition of the recommendation?

Response. Relocation of families was considered, but was regarded as a significant morale issue for a forward-deployed air wing. At a point during the time period, families were provided notice of the concerns surrounding the Shinkampo Incineration Complex prior to moving to Atsugi NAF and had the option of curtailing their tour. USFJ was fully engaged in the Shinkampo issue, and consistently raised the Shinkampo problem at Joint Committee meetings with the Government of Japan.

Question 2. In June 2009, the Navy and Marine Corps Public Health Center released an "Executive Summary for NAF Atsugi Health Study," which compared health outcomes experienced by NAF Atsugi residents with health outcomes of individuals stationed at another base in Japan. According to that summary, "[c]entral nervous system, liver and kidney damage were not included [in the study] for their non-cancer effects because the available literature was felt to be inadequate regarding the very low levels reported" in the Navy's 2002 Human Health Risk Assessment. However, the medical records of former NAF Atsugi residents contain a form explaining that they were exposed to 12 emissions that exceeded the Environmental Protection Agency's ambient air quality standards.

A. Is the Navy aware that the Agency for Toxic Substances and Disease Registry has found that exposure to some of those chemicals, such as carbon tetrachloride, may cause liver, kidney, and central nervous system damage?

Response. Yes, the Navy is aware that the Agency for Toxic Substances and Disease Registry (ATSDR) publishes a list of reported health effects from studies that include some of the chemicals that were also found in the NAF Atsugi Health Study. These documents were reviewed when determining the health effects to include in the NAF Atsugi Study. ATSDR also reported levels of exposure at which these effects might be observed in humans, but these levels were much greater than those reported in the Navy's 2002 Human Health Risk Assessment. The presence of a chemical is not sufficient to associate it as the cause of disease. The studies cited by ATSDR were mostly occupational and had exposures much higher than those measured, during the NAF Atsugi, Japan Human Health Risk Assessment, dated June 2002.

As stated in the full report of the NAF Atsugi Health Study (Paragraph V.A.2), the ambient air concentrations measured in Atsugi were primarily compared to the concentrations reported by the US Environmental Protection Agency (USEPA). If the USEPA did not have a current risk assessment, other sources were used for the health effects comparison. As an example, the mean ambient air concentration for carbon tetrachloride was reported to be 0.616 micrograms per cubic meter of air (ug/m3). For comparison to the levels reported by USEPA and in the literature, the mean value had to be converted to parts per million (PPM). Based on the atomic mass of carbon tetrachloride, 0.616 ug/m3 converts to 0.1 PPM (at 20 degrees centigrade and 1 atmosphere of pressure). When this level is compared to the studies cited in the ATSDR Toxicological Profile for Carbon Tetrachloride, no non-cancer health effects were observed in humans.

B. What steps does the Navy intend to take to ensure that these or other relevant health effects are considered in investigating the long-term health effects that might be associated with the exposures at NAF Atsugi?

Response. Navy Medicine has not been tasked to investigate the long-term effects for residents of Atsugi when the incinerator was operating. Navy Medicine does not have full access to the medical information for persons once they leave active service.

Question 3. The Navy testified that a Department of Defense and Department of Veterans Affairs working group "agreed the VA would receive a list of all affected Active Duty personnel stationed at NAF Atsugi from 1985–2001" and that this information "will aid in any future outreach or surveillance activities for this population."

A. In addition to maintaining a Web site with information related to NAF Atsugi, what future outreach activities and public communications does the Navy intend to use to ensure that former NAF Atsugi residents are aware of the environmental exposures related to the Shinkampo incinerator?

Response. The Navy Marine Corps Public Health Center (NMCPHC) web page is BUMED's primary means of communicating the information to those with questions and concerns.

The maintenance and updating NMCPHC's Web site is Navy Medicines primary means of communicating this information. Further communication plans fall outside of Navy Medicine's purview.

B. Has the Navy already shared with VA the names of individuals who were stationed at NAF Atsugi between 1985 and 2001? If not, when will those names be provided to VA?

Response. As mentioned during the hearing, Navy Medicine has presented the pertinent information before the DOD/VA Deployment Health Working Group focusing on environmental exposures on 11 June 2009. The VA is aware of the type of information Navy Medicine has available, but to date no official request from the VA has been received by Navy Medicine.

Chairman AKAKA. Thank you very much, Dr. Gillooly, for your testimony, and now we will receive the testimony of General Payne.

STATEMENT OF MAJOR GENERAL EUGENE G. PAYNE, JR., ASSISTANT DEPUTY COMMANDANT, INSTALLATIONS AND LOGISTICS (FACILITIES), HEADQUARTERS, U.S. MARINE CORPS.

General PAYNE. Senator Akaka, Senator Burr, thank you for the opportunity to appear before you and participate in this hearing regarding past drinking water exposures at Marine Corps Base Camp Lejeune.

My name is Major General Gray Payne and I am the Assistant Deputy Commandant for Installations and Logistics for Facilities. In that regard, I am responsible for Marine Corps facilities and services issues on all of our installations, to include environmental protection.

The health and welfare of our Marines, sailors, their families, and our civilian workers are a top priority for the Marine Corps. The Marine Corps is and always has been a very large family and we all know people, including myself, who are stationed or worked at Marine Corps Base Camp Lejeune during their military careers.

The Marine Corps is deeply concerned with all the military and civilian families who are experiencing or have experienced any health issues. We understand that there are those who believe their health concerns may be a result of time spent at Camp Lejeune. The Marine Corps consists of war fighters and those who directly support war fighters. We have no public health experts.

Accordingly, we rely on the expertise of the scientific organizations like the Agency for Toxic Substances and Disease Registry, or ATSDR, and the National Academies National Research Council, or NRC, to inform our understanding of this issue. We have provided over $14.5 million in funding and have exhausted countless man hours and direct support of research initiatives. Unfortunately, the studies completed to date have not determined whether or not there is an association between the past contamination and adverse health effects.

We would like nothing more than to have those hard questions answered. So, we will continue to support and cooperate with the Department of Veterans Affairs, the ATSDR, and the NRC in an effort to get answers for those of our Marine Corps family who may have been exposed to volatile organic compounds in drinking water at Camp Lejeune in the past.

Sir, you have my written statement, so in the interest of time, I will conclude my remarks, and I am certainly available to answer any questions you may have.

[The prepared statement of General Payne follows:]

PREPARED STATEMENT OF MAJOR GENERAL EUGENE G. PAYNE, JR., ASSISTANT DEPUTY COMMANDANT FOR INSTALLATIONS AND LOGISTICS (FACILITIES), HEADQUARTERS, U.S. MARINE CORPS.

Senator Akaka, Senator Burr, distinguished Members of the Committee; thank you for the opportunity to appear before you and participate in this hearing regarding past drinking water exposures at Marine Corps Base Camp Lejeune. My name is Major General Gray Payne and I am the Assistant Deputy Commandant for Installations and Logistics for Facilities. I am responsible for Marine Corps facilities and services issues on our installations, to include environmental protection.

The health and welfare of our Marines, Sailors, their families, and civilian workers are a top priority for the Marine Corps. The Marine Corps is and always has been a large family, and we all know people, including myself, who were stationed or worked at Marine Corps Base, Camp Lejeune during their military careers. The Marine Corps is deeply concerned with all the military and civilian families who are experiencing or have experienced any health issues and we understand that there are those who believe their health concerns may be a result of time spent at Camp Lejeune. The Marine Corps consists of war-fighters, and those who directly support war-fighters. We have no epidemiological experts, and accordingly we rely on the expertise of scientific organizations like the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Academies, National Research Council (NRC) to inform our understanding of this issue. We have provided over $14.5 million in funding and have exhausted countless man-hours in direct support of research ini-

tiatives. We will continue to support and cooperate with the Veterans Administration, the ATSDR and the NRC in an effort to get answers for those of our Marine Corps family who may have been exposed to volatile organic compounds (VOC) in drinking water at Camp Lejeune.

HISTORY OF DISCOVERY

It is important to keep in mind that the events surrounding this situation occurred over 25 years ago. Environmental standards and regulations have changed dramatically over the intervening years as a result of advances in scientific knowledge and increased public awareness. The events at Camp Lejeune must be considered in light of the scientific knowledge, regulatory framework, and accepted industry practices that existed at the time, rather than in the context of today's standards.

Trichloroethylene [TCE] and tetrachloroethylene [PCE] were discovered in the Camp Lejeune drinking water in the early 1980's. The circumstances that led up to the discovery are as follows. In 1981, Camp Lejeune officials became aware that VOCs were interfering with the analysis of potable water samples that were being collected in preparation for the implementation of future drinking water standards for Total Trihalomethanes (TTHM). Sampling conducted by a Navy contractor revealed that another chemical present in the water sample was interfering with the analysis; however, the type of chemical and source were unknown. Base personnel continued to sample the water for TTHMs over the next several years using various laboratories with varying results. Through targeted sampling in 1982, two of Camp Lejeune's eight public drinking water systems were determined to be contaminated by two chemicals—TCE and PCE. TCE and PCE are chemicals commonly found in degreasing agents and dry cleaning solvents respectively. It is important to note that there were no drinking water regulations in place for TCE, PCE, benzene, or vinyl chloride at the time of discovery. In the early 1980's, the Naval Assessment and Control of Installation Pollutants (NACIP) program, a precursor to the Department of the Navy (DON) Installation Restoration Program, was already in the process of identifying contaminated sites on Base for further sampling and investigation. Plans were in place to sample potable wells near the identified contaminated sites. It was these sampling events that identified, between late 1984 and early 1985, individual wells that contained groundwater impacted with TCE and PCE and other VOC's such as benzene. As the Base received sampling data on impacted wells, the wells were promptly removed from service. A separate investigation by the State of North Carolina in 1985 revealed leaks from an off-base dry cleaner had contaminated the wells near the Tarawa Terrace housing area. The Hadnot Point water system was contaminated by on-base sources. As referenced above, no drinking water standards for TCE or PCE were in place at the time of discovery, and all impacted wells were voluntarily removed from service promptly by Base direction in late 1984/early 1985. Initial regulation of these volatile organic compounds under the Safe Drinking Water Act did not begin until 1987. Final regulations on the chemicals were in force in 1989 and 1992, respectively.

NOTIFICATION

Camp Lejeune first notified military personnel and family members about the impacted drinking water on December 13, 1984, through an article appearing in Camp Lejeune's newspaper, The Globe. Camp Lejeune also distributed a public notice to residents of Tarawa Terrace on April 30, 1985. In May 1985, Camp Lejeune issued a press release announcing the water contamination problem and explaining the steps being taken to restore water services to the affected base residents. Jacksonville Daily News and Wilmington Morning Star printed stories on the situation on May 11 and 12, 1985.

In 2000, ATSDR requested assistance from the Marine Corps to reach additional participants for a survey they were conducting. At the time, the number of participants was approximately 6,500. ATSDR needed over 12,000 for a statistically valid study. The Marine Corps played an active role in assisting ATSDR in identifying participants eligible for the survey through both targeted and global notifications. In January 2000, Camp Lejeune held an "open house" with base residents and the Jacksonville community to discuss issues about the drinking water previously discovered to contain VOCs. In August 2000, Headquarters Marine Corps sent a message to all Marines worldwide in an effort to reach potential ATSDR survey participants. In addition, articles were published in numerous base newspapers including the Quantico Sentry, Camp Lejeune Globe, and Camp Pendleton Scout, which have a large readership of both active duty and retired military members. Camp Lejeune also solicited participants for the ATSDR survey by sending a press release to other military base publications. In November 2000, Headquarters Marine Corps held a

press brief at the Pentagon asking media to assist in helping to reach survey participants. On January 25, 2001, Headquarters Marine Corps sent a second message to all Marines worldwide in an effort to reach potential ATSDR survey participants. In February 2001, regional media outreach efforts began, and outlets reached included:

(A) TV Stations—1027 outlets
(B) Daily Newspapers—1373 outlets
(C) Weekly Newspapers—1171 outlets
Total: 3571 media outlets contacted.

In 2001, Headquarters Marine Corps requested approval from the Department of Defense to release to the ATSDR the Social Security numbers of potential survey participants. In July 2001, Headquarters Marine Corps received approval from DOD for a limited release of Social Security Number information covered by the Privacy Act to the ATSDR in order to support the ATSDR's survey participant location efforts. Based on extensive data searches by Headquarters Marine Corps, contact information for the names of potential survey participants was identified and forwarded to the ATSDR.

The FY08 National Defense Authorization Act mandated that the Secretary of the Navy attempt to directly notify former residents of Camp Lejeune of their potential exposure to the chemicals. The Act also required that ATSDR develop a health survey to be included with the notification letter. On Sept. 14, 2007, the Marine Corps posted a link to the registration database on its Web site (www.marines.mil/clsurvey) so that former Camp Lejeune residents and workers as well as interested parties can be placed on a contact list to receive notification and information regarding this important issue. The call center became operational September 17, 2007 and is used as another tool to locate former residents and workers and register them to receive additional updates to the ongoing studies. In addition to direct notifications, the Marine Corps continues to use various general communication venues to reach former base residents and workers to encourage them to register. This general notification has included articles and/or advertisements in: newspapers such as *USA Today*; periodicals such as *Time* and *Newsweek*; internet advertisements on general consumer Web sites such as WebMD and Weather.com.; military related Web sites such as the Leatherneck, U.S. Navy Institute, and the Vietnam Veterans Association; internet search engines such as Yahoo! and Google; and radio broadcasts. As of September 28, 2009, more than 140,000 individuals have been registered with the Marine Corps.

ATSDR HEALTH INITIATIVES

All military installations on the National Priorities List of hazardous waste sites, including Camp Lejeune which was listed in 1989, undergo a Public Health Assessment conducted by the ATSDR to determine if there are any current or past health concerns resulting from past practices.

In 1992, the Agency for Toxic Substances and Disease Registry (ATSDR) made its first of many site visits to Camp Lejeune as part of its statutory duty to conduct a public health assessment (PHA). In 1997, the ATSDR published its PHA for Camp Lejeune. In the PHA, the ATSDR stated that the Volatile Organic Compound-impacted water would not likely harm adults. (Earlier this year ATSDR withdrew the PHA from their Web site in part because it believes that the statement was overly reassuring.). The ATSDR recommended, however, an epidemiological study of former Camp Lejeune residents to determine what effect, if any, the VOCs may have had on the health of prenatal children. This population was considered by the ATSDR to be the most susceptible population to health impacts from VOCs. In support of this recommendation, a health study began in 1999 as a survey to determine whether or not a statistically significant study population could be reached for a case control study. In January 2002, the ATSDR closed its survey with 12,598 eligible participants, and began its analysis of survey results. In July 2003, the ATSDR released a progress report of the survey and concluded that a follow-on case control/epidemiological study was warranted. The Marine Corps actively participated in publicizing this report through a press release, a Web cast by the Deputy Commandant for Installations and Logistics, and by posting survey information on the Marine Corps Camp Lejeune drinking water web page. ATSDR also determined in 2003 that extensive water modeling would be needed at Camp Lejeune in support of the case control study. That water modeling continues today and is currently projected to be complete in September 2011. The case control study will be completed sometime thereafter.

In 2005, the Marine Corps hired a contractor to perform a comprehensive search of Camp Lejeune to provide a better confidence level that all potentially relevant

documents had been found. ATSDR and other interested parties have been provided access to all documents that were found. In addition, we have been working with agencies outside of the Marine Corps to ask them to provide information that may be under their control.

INDEPENDENT REVIEWS AND INVESTIGATIONS

Three independent reviews have been conducted of the actions taken by Marine Corps personnel on this matter: an Independent Drinking Water Fact-Finding Panel chartered by the Commandant of the Marine Corps, an EPA Criminal Investigation Division investigation, and a Government Accountability Office review.

In 2004 the Fact-Finding Panel determined that Camp Lejeune provided drinking water at a level of quality consistent with general water industry practices in light of the evolving regulatory requirements at the time.

In 2005 the EPA concluded that there had been no violations of the Safe Drinking Water Act, no conspiracy to withhold information, falsify data, or conceal evidence.

In 2007 the GAO issued a report that describes efforts to identify and address the past contamination, activities resulting from concerns about possible adverse health effects and government actions related to the past contamination. The report had no findings or recommendations for the Marine Corps.

In accordance with the 2007 National Defense Authorization Act, the Marine Corps contracted with the National Academy of Sciences—NRC to review the evidence regarding potential associations between exposure to contaminated drinking water at Camp Lejeune and adverse health effects in prenatal children, children, and adults. The NRC review report concluded that while former Camp Lejeune residents and workers were exposed to unregulated solvents, there are no conclusive associations between adverse health effects and exposure to the impacted water at the base. The report opined that further study was unlikely to provide definitive information about the health effects of such exposure. The report noted that the highest levels of either TCE or PCE measured in the mixed-water samples at Camp Lejeune were much lower than the lowest dose that caused adverse effects in the most sensitive strains of species of laboratory animals. The review concluded, however, that even though adverse effects were unlikely, they could not be ruled out completely and that the DON (and other policymakers) should move forward with responses they deem appropriate based on available information.

We are aware of ongoing assessment activities currently being undertaken by the US EPA and remain interested in that process.

COORDINATION WITH DEPARTMENT OF VETERANS AFFAIRS

As part of the Marine Corps robust outreach and notification campaign we have worked extensively with various Veterans Affairs offices. In 2007 and 2008 we sent notification and registry posters to a total of 210 VA centers in all 50 states as well as the US Territories and Washington, DC . We also sent copies of posters in 2007 and 2008 to VFW District Offices and Military Treatment Facilities in all fifty states, US Territories and Washington, DC. In addition, in March of this year, we worked with VA public affairs to alert VA program directors and other executives of new information about the water contamination issue via an email release. In particular, this email release provided information on the pending release of the National Research Council research. VA personnel were asked to directly contact HQ USMC public affairs for additional information and assistance.

CONCLUSION

I have received letters from, and have personally spoken with individuals who feel that they have been harmed by Camp Lejeune water. Their stories are very sad, and my heart goes out to them. The Marine Corps has done and is doing everything it can for them, recognizing that we are not scientists or health care professionals, and neither can we address claims for compensation. What we can do, have done, and commit to continuing to do is to cooperate with the Veterans Administration, the ATSDR, the NAS, and other appropriate agencies and scientific organizations as they address the scientific and medical issues, and keep our Marine family informed of any progress.

RESPONSE TO POST-HEARING QUESTION SUBMITTED BY HON. DANIEL K. AKAKA TO MAJOR GENERAL EUGENE G. PAYNE, JR., ASSISTANT DEPUTY COMMANDANT FOR INSTALLATIONS AND LOGISTICS (FACILITIES), HEADQUARTERS, U.S. MARINE CORPS.

Question 1. Please provide us with a detailed breakdown of the number of servicemembers and family members who lived or worked on Camp Lejeune between 1957 and 1987. Specifically, please detail the number of active duty servicemembers, spouses, children, and number of babies born to servicemembers during that time period.

Response. Unfortunately, detailed data for servicemembers and family members who lived or worked on Camp Lejeune between 1957 and 1987 does not exist. The Marine Corps can only make crude estimations extrapolated from the limited available data using assumptions that will likely produce conservatively high estimations. We estimate that at Camp Lejeune between 1957 and 1987 there were:

- As many as 630,000 servicemembers.
- As many as 60,000 spouses.
- As many as 60,000 dependent children.
- As many as 30,000 births.
- Total population estimate = 500,000–800,000

Note: These estimates do not include Marine Corps Air Station New River. Data from the Defense Manpower Data Center (DMDC), Camp Lejeune housing, Camp Lejeune schools, and Agency for Toxic Substances and Disease Registry (ATSDR) studies were used to produce these estimates.

Question 2. How many servicemembers who were on active duty between 1957 and 1987 at Camp Lejeune are still on active duty?

Response. The Marine Corps does not maintain such data. We have contacted the Defense Manpower Data Center to see if an estimate is possible.

Question 3. When did the Marine Corps know about TCE and PCE contaminants in the water at Camp Lejeune, and what did the Marine Corps do about it?

Response. Volatile organic compounds (TCE, PCE, benzene and others) were discovered in the drinking water at Camp Lejeune in the early 1980's.

In 1981, Camp Lejeune officials first became aware that VOCs were interfering with the analysis of potable water samples that were being collected in preparation for the implementation of future drinking water standards.

In 1982 and 1983, continued testing identified two VOCs of primary concern—trichloroethylene (TCE), a metal degreaser, and tetrachloroethylene (PCE), a dry cleaning solvent—in two water systems that served base housing areas, Hadnot Point and Tarawa Terrace. Notably, TCE and PCE were not regulated under the Safe Drinking Water Act until 1989 and 1992 respectively. Additional testing at the same sources, but later in time, resulted in variances on the level of contaminants discovered within the water. Navy Assessment and Control of Installation Pollutants (NACIP) program plans were already in place to identify contamination sites and to sample potable wells near such sites.

In 1984, the source of contamination was found when the NACIP program identified VOCs in some of the individual wells serving the Hadnot Point and Tarawa Terrace water systems. As impacted wells were identified, they were promptly removed from service.

Following the initial discovery of contamination in the wells in 1984, the Base Commanding General sent a notification letter to residents, and the Public Affairs Office ran an article in the Base newspaper and held a press event with local media.

As more information became available through further studies the Marine Corps' outreach efforts broadened to the national population.

The Marine Corps has collaborated with the ATSDR from the beginning of its studies to determine the extent of the contamination, and whether adverse health effects may have resulted from it. For example, in 1999, the Marine Corps conducted an outreach/mass media campaign to assist the ATSDR in locating potential participants for the scientific study. This study population included parents that were pregnant while living in on-base housing from 1968–1985. To assist ATSDR with its recruiting efforts for the study, the Marine Corps distributed announcements to more than 3,500 media outlets (TV, daily & weekly newspapers), as well as releasing two (2) separate worldwide Marine Messages. The USMC has and will continue to actively help with outreach for ATSDR's studies. Collaboration with ATSDR continues to the present day.

Additionally, the Congress at Public Law 109–364, Section 318 directed the Navy to request a review by the National Academies' National Research Council (NRC) to address the scientific evidence on whether reported adverse health effects can be associated with past contamination of the water supply at Camp Lejeune. This

recently published study (released June 13, 2009) by the NRC, an independent Council of scientific experts, addressed TCE and PCE as the primary contaminants of concern. A copy of the report can be obtained at http://nationalacademies.org/morenews/20090613.html.

Among other things, the NRC report stated that it "cannot be determined reliably whether diseases and disorders experienced by former residents and workers at Camp Lejeune are associated with their exposure to past contaminants in the water supply because of data shortcomings and methodological limitations, and these limitations cannot be overcome with additional study." In addition, the report states that the results of their comparison of the lowest dose of TCE and PCE at which adverse effects were observed in animal studies against approximated doses to former residents measured in mixed water "suggest that the highest levels of either TCE or PCE measured in the mixed-water samples at Camp Lejeune were much lower than the lowest dose that caused adverse effects in the most sensitive strains and species of laboratory animals."

Three independent reviews have been conducted of the actions taken by the Marine Corps at the time (2004 Drinking Water Fact-Finding Panel, an EPA Criminal Investigation Division investigation, and the 2005 Government Accountability Office review).

The Fact-Finding Panel determined that Camp Lejeune provided drinking water at a level of quality consistent with general water industry practices in light of the evolving regulatory requirements at the time.

The EPA Criminal Investigation Division concluded that there had been no violations of the Safe Drinking Water Act, no conspiracy to withhold information, falsify data, or conceal evidence regarding violation of any law.

The GAO report describes efforts to identify and address the past contamination, activities resulting from concerns about possible adverse health effects and government actions related to the past contamination, and the design of the current ATSDR study, including the study's population, timeframe, selected health effects, and the reasonableness of the projected completion date.

Additional information on the Fact-Finding Panel, the EPA investigation, and the GAO report are available at: www.marines.mil/clwater.

Finally, the Marine Corps is working to notify anyone who lived or worked at Camp Lejeune prior to 1987 of the historic drinking water issue. To identify and inform these individuals, the Marine Corps developed an outreach response using multiple forms of communication and media.

- Distributed print articles to more than 10,000 newspapers nationwide
- Created radio spots distributed to more than 6,500 radio stations
- Developed online advertising for consumer- and military-related Web sites, including Yahoo, Google, WebMD, Vietnam Veterans of America and Leatherneck and Gazette Web site
- Placed advertising in national publications, including *USA Today, Time* and *Newsweek*
- Placed advertising in military-related publications, such as *Leatherneck, Gazette* and *Semper Fi*.
- Provided posters and print announcements distributed to VA facilities nationwide
- Distributed posters to all US-based commissaries
- Conducted interviews with newspaper and broadcast journalists
- Created a Web site providing a compilation of information on the historic drinking water issue and links to other sites with related information

In addition, the Marine Corps has worked with the Internal Revenue Service to locate former Marines who have lived or worked on Camp Lejeune 1987 and before. The IRS used its database to mail an estimated 150,000 letters from August 1 to October 1, 2008.

Currently, approximately 145,000 former residents are registered, and the Marine Corps encourages anyone who has not registered to do so by calling 877–261–9782 or online at https://clnr.hqi.usmc.mil/clwater/index.html.

Question 4. When did the Marine Corps notify residents of Camp Lejeune about the water contamination, and in what form did that notification occur?

Response. Following the initial discovery of contamination in the wells in 1984, the Base Commanding General sent a notification letter to residents, and the Public Affairs Office ran an article in the Base newspaper and held a press event with local media.

As more information became available through further studies the Marine Corps' outreach efforts broadened to the national population.

The Marine Corps has collaborated with the ATSDR from the beginning of its studies to determine the extent of the contamination, and whether adverse health effects may have resulted from it. For example, in 1999, the Marine Corps conducted an outreach/mass media campaign to assist the ATSDR in locating potential participants for the scientific study. This study population included parents that were pregnant while living in on-base housing from 1968–1985. To assist ATSDR with its recruiting efforts for the study, the Marine Corps distributed announcements to more than 3,500 media outlets (TV, daily & weekly newspapers), as well as releasing two (2) separate worldwide Marine Messages. The USMC has and will continue to actively help with outreach for ATSDR's studies. Collaboration with ATSDR continues to the present day.

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RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY HON. RICHARD BURR TO MAJOR GENERAL EUGENE G. PAYNE, JR., ASSISTANT DEPUTY COMMANDANT FOR INSTALLATIONS AND LOGISTICS (FACILITIES), HEADQUARTERS, U.S. MARINE CORPS.

Question 1. The term "organic solvents" has been used since the 1970s to reference organic liquids, such as Volatile Organic Compounds. When Major General Payne was asked at the hearing whether he knew if the specific term "organic solvents" in Camp Lejeune Base Order 5100.13B had changed over the years since the order was published, Major General Payne indicated that he was not knowledgeable on that issue.

A. Was Major General Payne stating that, in his official capacity, he should not be expected to know the purpose or relevant details of Camp Lejeune Base Order 5100.13B, a Marine Corps order that has been referenced in formal requests for information to the Marine Corps by Members of Congress and an order that was cited during Senator Burr's recent meeting with the Commandant of the Marine Corps regarding the Camp Lejeune water contamination?

B. Was Major General Payne stating that the Marine Corps does not know and understand the formal definition of the term "organic solvents" or have access to environmental experts who know and understand the formal definition of the term "organic solvents" as it appears in Camp Lejeune Base Order 5100.13B, an order that detailed the procedures for the proper disposal of chemicals and hazardous waste on Camp Lejeune?

C. Does the Marine Corps agree that the term "organic solvents" includes Volatile Organic Compounds (see the definition from National Institute of Occupational Safety and Health)? If the Marine Corps does not agree that "organic solvents" include Volatile Organic Compounds, what types of chemicals was the Marine Corps referencing when using the specific term "organic solvents"?

Response. Major General Payne was asked to speculate on the accepted definition of the term "organic solvent" circa 1974, how the authors of Camp Lejeune Base Order 5100.13B defined that term when they wrote the Order in 1974, and whether the definition of that term had changed over the years since the order was published. Major General Payne is neither a scientist, nor a subject matter expert on

"organic solvents," nor a historian. Accordingly, he properly declined to answer the questions. To the more specific question: today, does the term "organic solvents" include VOCs; as we understand the definition today, we believe that VOCs are properly categorized as organic solvents.

Question 2. The Marine Corps maintains a Camp Lejeune Water Study database for the former residents of Camp Lejeune. The registry now contains over 144,000 registrants.

A. How many of the registrants are military veterans who once served on Camp Lejeune?

Response. The Marine Corps does not put any stipulations on who is allowed to register with the Camp Lejeune Historic Drinking Water Registry; therefore, anyone interested in receiving additional information and notifications may request to be placed in the registry.

The registry does not require registrants to identify if they are Military veterans. Using several assumptions, the Marine Corps estimates that as of October 29, 2009; approximately 87,000 registrants may be Military veterans who once served at Camp Lejeune, NC.

B. How many of the registrants are former dependents or family members of veterans who once served on Camp Lejeune?

Response. The Marine Corps again uses several assumptions in estimating the number of registrants who may be former dependents or family members of veterans who once served at Camp Lejeune, NC. We estimate that approximately 58,000 individuals in the registry fall into this category.

C. Does the Marine Corps plan to share the names of those individuals with VA so that it may use that information to better treat veterans already enrolled in VA's health care system or proactively outreach to those not yet enrolled?

Response. The Marine Corps has contacted the VA and has begun the process to transfer information from our database to the VA.

1. The Marine Corps has established contacts that will make the official request for the data.

2. The Marine Corps has provided the VA with a data dictionary in order for them to determine what available information they need to accomplish their task.

3. The Marine Corps will follow the Federal statute that requires placing a notice in the Federal Register to update the System of Records Notice (SORN) associated with the Camp Lejeune database in order to share the data with the VA.

The Marine Corps will continue to collaborate with the VA in order to identify the most appropriate manner in which to transfer the data.

Chairman AKAKA. Thank you very much, General Payne. Mr. Resta, your testimony, please.

STATEMENT OF JOHN J. RESTA, SCIENTIFIC ADVISOR, U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

Mr. RESTA. Good afternoon, Senator Akaka, Senator Burr. Thanks for the opportunity for me to speak today about the occupational environmental health exposures in military operations.

My name is John Resta. I serve as Scientific Advisor for the U.S. Army Center for Health Promotion and Preventive Medicine, also known as the CHPPM. Our workforce at the CHPPM is dedicated to keeping soldiers healthy. One of our primary responsibilities is to provide deployed commanders assistance in identifying, assessing, and countering occupational and environmental health hazards.

During military operations, soldiers, sailors, airmen, Marines, and civilian employees who also deploy may encounter numerous occupational and environmental health hazards that have the potential to cause illness and injury. In our written statement, we provided the Committee specific details on what actions we have taken to address these hazards at the Qarmat Ali Water Treatment Plant and the Joint Base Balad Burn Pit with an emphasis on the

results of the medical evaluations and health risk assessments we have conducted to date.

These risk assessments have relied on numerous medical examinations, clinical lab tests, exposure questionnaires, and thousands of occupational and environmental samples. At Qarmat Ali, we concluded from the medical evaluations conducted on the soldiers and Department of Army civilians who served at the site during the assessment period that no significant exposure to sodium dichromate had occurred. These results, coupled with the occupational environmental samples that were collected, indicate that all soldiers and Department of Army civilians who served at the site at any time are unlikely to experience future adverse health effects.

This conclusion was validated by the Defense Health Board following their review of the health risk assessment. The Defense Health Board is an independent advisory panel made up of nationally recognized medical and scientific experts from academia and industries. Our burn pit health risk assessments have concluded that smoke exposures could lead to short-term, reversible irritant health effects.

Smoke from burning trash and other wastes, especially in combination with hot, dry, dusty conditions, cause temporary irritation of the eyes, nose and throat in most people, regardless of their health condition. However, no environmental monitoring to date collected at Joint Base Balad has identified a risk for future adverse health effects.

It is possible that combinations of some exposures, such as smoke from the burn pits, high levels of airborne dust, and cigarette smoking, may increase the risk of chronic health conditions in a small number of people. We have no direct evidence of this at this present time. We will be monitoring the air quality at Joint Base Balad in concert with the Air Force and the Navy over the next year, even though municipal solid waste incinerators have largely replaced open burning there.

We are continuing to communicate the findings and limitations of these risk assessments to our soldiers and other servicemembers in an understandable form. We have challenges in this endeavor. For example, it is often difficult to answer the fundamental question, will I get sick?

Current health risk assessment science does not adequately address the health risks from combined exposures like burn pit smoke, nor can it determine whether a disease that has multiple causes and develops over a long period of time in an individual was caused by a specific exposure. We continue to seek more innovative methods to assess health risks and are working with both the National Academy of Sciences and the Defense Health Board.

We continue to address our soldiers' health concerns and are working to ensure that they and their health care providers are informed about these incidents.

Mr. Chairman, thank you for the opportunity to be here today and discuss our role in these important actions. I look forward to answering any questions you or the Committee might have. Thank you.

[The prepared statement of Mr. Resta follows:]

PREPARED STATEMENT OF JOHN J. RESTA, SCIENTIFIC ADVISOR, U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

Chairman Akaka and distinguished Members of the Committee, thank you for inviting me here today to speak about occupational and environmental health exposures in military operations and the efforts of my organization, U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), in preventing disease and non-battle injuries to our Soldiers and deployed civilian employees.

The USACHPPM is a subordinate command of the U.S. Army Medical Command. USACHPPM's military and civilian personnel are experts in more than 50 public health disciplines. They include occupational and environmental medicine physicians, public health and occupational health nurses, epidemiologists, industrial hygienists, environmental engineers, health risk assessors, chemists, toxicologists and many others. We provide consultative services in these disciplines through a worldwide network, with our headquarters at Aberdeen Proving Ground, Maryland, and five subordinate commands at Landstuhl, Germany; Camp Zama, Japan; Fort George G. Meade, Maryland; Fort Sam Houston, Texas; and Fort Lewis, Washington. Since Operation Desert Storm in 1991, the USACHPPM has been providing technical assistance and support to deployed preventive medicine units and personnel who conduct occupational and environmental health surveillance activities. This continues through our current efforts in support of Operations Iraqi Freedom and Enduring Freedom.

Today, I'd like to speak with you about two specific occupational and environmental health exposures, the potential exposures to sodium dichromate at the Qarmat Ali Water Injection Facility in Iraq and the exposures to smoke from the open burning of solid waste in Iraq, Afghanistan and the Horn of Africa.

QARMAT ALI WATER INJECTION FACILITY

On September 15, 2003, the 1st Battalion, 152nd Infantry from the Indiana National Guard notified the Combined Forces Land Component Command-Surgeon (CFLCC-Surgeon) of its concerns regarding the site contamination at the Qarmat Ali Water Injection Facility. The Qarmat Ali facility was being repaired as part of Task Force Restore Iraqi Oil (TF-RIO) by an Army Corps of Engineers contractor. Within a day of notification, the site was placed off-limits and the CFLCC-Surgeon requested assistance from the USACHPPM in assessing the health risks associated with potential exposures to sodium dichromate. By this time, the contractor had started encapsulating the contaminated areas on the site. The DOD Inspector General is currently conducting a review of Army actions regarding the exposure of personnel to sodium dichromate at Qarmat Ali.

On September 30, 2003, a USACHPPM team comprised of an occupational-environmental medicine physician, environmental scientists, engineers, and industrial hygienists arrived at Qarmat Ali and started an Occupational and Environmental Health Survey and Risk Assessment, which they completed on October 24, 2003. This assessment included environmental samples from the soil, air, and living and working areas as well as medical examinations of the Soldiers and Department of Army civilians assigned to the site. No medical exams were provided to civilian contractors because occupational health for contractor employees is the employing contractor's responsibility.

The USACHPPM team conducted environmental soil, air and surface-wipe sampling, to include ambient air monitoring of the location and breathing-zone monitoring of USACHPPM team and military security team members. Soil sample results were below the Military Exposure Guidelines for hexavalent chromium and total chromium in all onsite areas, but were over the guidelines in one offsite area where exposure was not expected. The USACHPPM team recommended that the contractor perform further containment to encapsulate those areas. The average concentrations for hexavalent chromium and total chromium in the air were below the one-year Military Exposure Guidelines. In fact, no hexavalent chromium was detected in any breathing-zone air sample. The survey's surface-wipe sample results for hexavalent chromium dust indicated that the interior of the contractor trailer located at the Qarmat Ali Water Injection Facility compound was contaminated with hexavalent chromium dust. The USACHPPM team recommended moving the trailer to the boundary of the compound and completely decontaminating it.

Medical examinations were administered to 137 of the 161 potentially exposed Soldiers and DOD civilians in the 1st Battalion, 152nd Infantry from the Indiana National Guard and TF-RIO from the U.S. Army Corps of Engineers. There were 14 members who were not available for evaluation and 10 who declined all or part of the testing. The exams were conducted within 30 days of the last potential exposure at the site and within 120 days of site encapsulation. They included admin-

istering exposure (i.e., how long, how often a person would have been onsite) and symptom questionnaires as well as specific clinical medical tests tailored to assess chromium exposure. The people who were examined were the people who, according to their answers to the questionnaire, had the most potential for exposure in terms of time frequency and locations visited at the water treatment plant. The Soldiers were there before encapsulation (arriving in June 2003) as well as after encapsulation.

The comprehensive medical exams provided consisted of a medical history, a general physical exam, blood and urine testing (including red blood cell and serum chromium levels, complete blood counts, serum chemistries, liver and renal function tests, and routine urine analysis). Ancillary testing included chest x-rays and spirometry testing. Previously published information that the Soldiers and DOD civilians only received serum and urine analysis for chromium is incorrect.

Less than 30 percent of the people examined reported symptoms, and the symptoms that were reported were symptoms that could have a variety of causes. Eye or throat irritation was the most common symptom reported. None of those examined exhibited symptoms of over-exposure to chromium. All of the people tested had normal blood levels; more than half of the chromium blood tests were actually below the detection limit of the test. If a significant inhalation exposure to hexavalent chromium (the element of sodium dichromate that has been shown to be a lung carcinogen in studies of industrial workers exposed to high levels for more than two years) had occurred, elevated levels of chromium would have remained in the red blood cells for at least 120 days following exposure. Red-blood-cell testing of potentially exposed people occurred within 30 days of their last expected exposure and within 120 days of site encapsulation. Analysis of the blood testing for chromium was done at the Armed Forces Institute of Pathology in Washington, DC. Whole blood testing was chosen because other medical tests (serum, urine) weren't sensitive enough to detect chromium exposures beyond 30 days. The recent disclosures of severe symptoms by Soldiers (i.e., coughing up blood, chrome holes, etc.) were not reported to the risk assessment team in October 2003. The extent of these concerns cannot be determined with any objective data at this point, though we are attempting to locate medical records of servicemembers present at the site prior to the USACHPPM's arrival to determine if any specific medical conditions may have been linked to these Soldiers' service at the site.

The USACHPPM concluded that these medical results indicated that no significant exposure to sodium dichromate had occurred, and that the symptoms reported could be related to existing personal medical conditions and desert environment-related exposures, such as heat, sand, dust and wind. Based on the medical team's evaluation of medical and exposure assessment results, specific long-term follow-up surveillance of these people as a group was not recommended because the potential for long-term health effects caused by assignment to duty at the site was unlikely.

The Soldiers and DOD civilians located at the site were provided fact sheets about the potential exposures during the assessment and at a town hall meeting (open forum) with a question-and-answer session. Town halls were sponsored by unit leadership for all interested Soldiers and DOD civilians. The results of each person's medical exams, to include the whole blood test results were placed in the individual, hard-copy deployment medical records, along with a description of the potential exposure on a Standard Form 600 (Chronological Record of Medical Care Medical Record). The Army confirmed that the test results did in fact reach the Soldiers' hard-copy records. Potentially exposed Soldiers and DOD civilians were also instructed to direct healthcare providers to this information in their medical records and to raise any remaining concerns about this incident during their post-deployment health assessments. Medical follow-up for those Soldiers who have health concerns is available through the military medical system or the Department of Veterans Affairs, depending on the military status of the Soldier.

Based on the limited adverse health findings of the assessment, the survey team felt that there was limited benefit to conducting a medical evaluation on Soldiers that had relocated from the site prior to the arrival of the USACHPPM assessment team. The assessment team determined that units from the 1st Battalion, 162nd Infantry from the Oregon Army National Guard and 133d Military Police Company of the South Carolina Army National Guard were present at the site prior to the team's arrival. Soldiers from these units were asked to complete an exposure and symptom survey, either directly through unit town hall meetings or through medical providers at their new locations if they had relocated to another area. For these past-exposed Soldiers, there were no unit records available to document who served at the site and for how long. The completed surveys, along with a fact sheet for medical providers, was to be placed in Soldier medical records by the unit as documenta-

tion of potential exposure to sodium dichromate and for reference in case of future health concerns.

Throughout the assessment, the USACHPPM team ensured that the operational commanders were kept apprised of the assessment findings and conclusions, to include daily situational reports to the CFLCC medical cell and briefings to the commanders of the four deployed and potentially exposed units/groups (1st Battalion, 152nd Infantry, of the Indiana Army National Guard; 133rd Military Police Company of the South Carolina Army National Guard; 1st Battalion of the 162nd Infantry of the Oregon Army National Guard; and Task Force Restore Iraq Oil of the U.S. Army Corps of Engineers). A formal Occupational and Environmental Health Survey and Risk Assessment report containing all of the results and recommendations was submitted to CFLCC on January 15, 2004.

This report was initially classified in accordance with U.S. Central Command guidance; an unclassified report was published on January 10, 2009. At the time, DOD, Army, Joint Staff and U.S. Central Command Force Health Protection policy did not include a procedure for reporting deployment exposures or other operational public health information to non-deployed, rear area units such as the Indiana National Guard State Adjutant General or the U.S. Army Forces Command. This policy is being reevaluated at this time.

In addition to medical record information that is available to Department of Veterans Affairs (DVA) providers, the Deputy Assistant Secretary of Defense, Force Health Protection and Readiness has facilitated our collaboration with the DVA. In December 2008, DVA personnel reviewed a copy of the classified Occupational and Environmental Health Survey and Risk Assessment report. A copy of the declassified report was provided to the DVA in January 2009, and a presentation was made to the DOD/VA Deployment Health Working Group in May 2009.

The medical response to this incident was exemplary. The site was placed off-limits within a day of notification to the Combined Forces Land Component Command Surgeon. The USACHPPM deployed a team to theater within two weeks of request. The methodology and results of the USACHPPM assessment were reviewed, validated and cited as exemplary by the Defense Health Board, an independent review entity made up of medical and scientific professionals from academia and industry.

BURN PITS

As far back as Operation Joint Endeavor in Bosnia in 1996, military preventive medicine personnel recognized that while open burning of solid waste is sometimes an operational necessity during combat operations, it should be used to the minimum extent possible based on the operational situation. When open burning operations are necessary, they should be located as far downwind of personnel as possible.

In 2004, the USACHPPM deployed a response team to Camp Lemonier in Djibouti to assess the potential health risks from the burn pit smoke from an off-post burn pit located about 1.5 miles south of Camp Lemonier. At this location, the local population open-burned all of the solid waste from the surrounding area, to include the U.S. operations on Camp Lemonier. There was a solid waste incinerator present, but it was not in use at the time. The assessment consisted of advanced air sampling from volatile organic compounds, polyaromatic hydrocarbons, dioxins/furans and particulate matter less than 10 microns in diameter. The assessment concluded that the operational health risk estimate was moderate due to the elevated presence of acrolein and aluminum. Deployed preventive medicine teams have conducted several rounds of additional sampling at this location since. The operational health risk from acrolein was found to be low and was only detected above Military Exposure Guidelines sporadically.

In 2005, the burn pit operations at the Joint Base Balad were initially sampled by deployed preventive medicine teams. From their results, the USACHPPM concluded that additional sampling was needed to fully characterize the site. The USACHPPM and the U.S. Air Force School of Aerospace Medicine jointly performed both an operational health risk assessment and a long-term health risk assessment based on large-scale sampling events at Joint Base Balad in 2007. The sampling plan focused on burn pit emissions. Other potential and/or known sources of air emissions including airfield operations, diesel generators, ground vehicle operations, and naturally blowing sand and dust were also collected in the samples. The long-term health risk assessment was conducted using the U.S. Environmental Protection Agency (USEPA) standard health risk assessment methodology. The USEPA method is specifically designed to focus on people who may be the most sensitive to the effects of a particular exposure; therefore, it is considered to be very protective.

Using the USEPA method, the potential for short-term, reversible, irritant health effects to U.S. personnel was identified. Smoke from burning trash and other waste, especially in combination with hot, dry, dusty conditions, can cause temporary irritation of the eyes, nose and throat in some people, regardless of their health condition. However, no environmental monitoring data collected at Joint Base Balad to date have identified an increased risk for long-term health conditions. It is possible, however, that combinations of some exposures, such as smoke from burn pits, the high levels of airborne dust, and/or tobacco smoke in smokers, may increase the risk of chronic health conditions in a small number of people, although we have no direct evidence of this at the present time. Due to anecdotal concerns raised about possible dioxin exposures at Joint Base Balad, the USACHPPM conducted a pilot study in cooperation with the Centers for Disease Control and Prevention, National Center for Environmental Health Laboratory (CDC-NCEH). Serum samples of Balad veterans from the DOD's Serum Repository were randomly selected for dioxin analysis at the CDC-NCEH. Both pre- and post-deployment samples were selected from the sera of personnel who had been deployed to Joint Base Balad at least twice for at least one year per deployment. The analyses did not find elevated levels of dioxin in the sera, as would be expected if personnel had been breathing elevated concentrations of dioxin during their deployments.

The USACHPPM and U.S. Air Force School of Aerospace Medicine have authored various risk communication products, including fact sheets and briefing slides, so that Service Members are aware of the results of sampling and health risk assessments as they are completed. The fact sheets can be found on both the USACHPPM Web site and in Department of Defense Deployment Health and Family Readiness Library.

To improve on the lessons we've learned from this situation, we authored guidance on the use, operation and location of burn pits that was published in Headquarters, Department of the Army, Technical Bulletin, Medical 593, Guidelines for Field Waste Management, September 2006. This guidance is straightforward. The preferred method of solid waste disposal is incineration. Open burning should only be used in emergency situations until approved incinerators can be obtained. The potential use of improper burning methods can lead to significant occupational and environmental health exposures to deployed troops. We recommend that burn pit operations be conducted as far downwind as possible (at least 450 feet) from troop locations and living areas. Hazardous waste, batteries and medical waste should not be burned.

The USACHPPM and U.S. Air Force School of Aerospace Medicine briefed the Department of Defense/Department of Veterans Affairs Deployment Health Working Group in March 2009 on the burn pit health risk assessments at Joint Base Balad. The meeting focused on the air quality surveillance efforts at Joint Base Balad, Iraq, which included sampling for a range of toxic chemicals potentially produced by open burning of solid waste. We discussed the short- and long-term health effects expected based on the analyzed chemicals, data gaps, and possible future efforts to better characterize potential burn pit smoke exposures. We also addressed the DVA's questions arising from various misleading media accounts of burn pits and burn pit exposures. Since that time we have been consulting with the DVA on their inquiries into the extent of burn pit operations and the results of air sampling at other burn pit locations in the U.S. Central Command area of responsibility.

The USACHPPM, U.S. Air Force School of Aerospace Medicine, and the Navy and Marine Corps Public Health Center are jointly developing an air surveillance program for contingency operations, with a focus on locations with burn pits. The sampling plan will be coordinated with the Defense Health Board with the goal of identifying a field-expedient sampling strategy that is considered representative and defensible. The USACHPPM also is collaborating with the U.S. Army Engineer School Directorate of Environmental Integration to update Army deployment environmental management doctrine.

As a result of its assessments at Balad and Qarmat Ali, the USACHPPM continues to modify, update and expand deployment occupational and environmental health surveillance and preventive medicine activities from our experiences and lessons learned. Specific surveillance lessons learned from the Qarmat Ali Water Injection Facility and Joint Base Balad incidents include:

- Producing, disseminating and archiving both classified and redacted deployment occupational and environmental health surveillance reports on both classified and unclassified networks.
- Ensuring that our military and civilian personnel who deploy to active theaters of operation for deployment occupational and environmental health incidents are continually trained and up to date on personal deployment requirements.

Mr. Chairman and distinguished committee members, my thanks for inviting me to speak with you about the U.S. Army Center for Health Promotion & Preventive Medicine's role in environmental surveillance and health assessment of potential sodium dichromate exposures and open-pit burning in overseas contingency operations. Thank you for holding this hearing and for your enduring support of servicemembers serving across the globe. I look forward to your questions.

RESPONSE TO POST-HEARING QUESTIONS SUBMITTED BY HON. DANIEL K. AKAKA TO JOHN J. RESTA, SCIENTIFIC ADVISOR, U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE

Question 1. The Army has stated that there is no evidence that exposure to sodium dichromate at Qarmat Ali will cause adverse or long term health effects, and that symptoms can be attributed to other factors. What other, environmental or otherwise, factors could be responsible for such conditions?

Response. During the CHPPM evaluation in 2003, Soldiers from the 1–152nd IN BN (INARNG) and DA Civilian employees from Task Force Rio were questioned regarding symptoms (symptoms are complaints) and observed for signs (signs are visible findings on examination). In the desert environment of Iraq and Kuwait, the symptoms reported by the Soldiers were a common experience for Soldiers in the country. Of the total population, about 77% did not report symptoms and 23% reported symptoms. The symptoms that they complained of were irritative or inflammatory in nature, and included irritation of the nose (9%), throat (7%), eyes (6%), lungs (4%), skin (1.4%), sinuses (1.4%), and general/other (3%). Overall, there was a low incidence of each individual symptom, with nasal symptoms being the most common.

These symptoms are non-specific, meaning that they are not specific to a single etiology or cause. As stated in the report, irritation of the eyes, nose and throat are not uncommon in a dry and dusty desert environment, due to heat, sand, dust, and wind. In a survey performed by Roop, et al on the prevalence of symptoms during deployment, 50% of non-asthmatics reported cough, and 55% reported allergy symptoms while deployed. (See "Military Medicine Volume 172 Number 12 Dec 2007") In addition to these environmental factors, the differential diagnosis (or list of other possible medical conditions to consider) for these symptoms are myriad.

Common causes of irritation and inflammation symptoms of the upper and lower airways are many, and include asthma, allergic rhinitis ("hay fever"), chronic bronchitis (tobacco), emphysema, bronchiectasis, and infections (such as the common cold, influenza, pneumonia, tuberculosis, or whooping cough).

With irritation of the eyes, possible medical conditions to consider would include conjunctivitis, which is inflammation and irritation of the conjunctiva, the mucous membrane that lines the eyelids. Conjunctivitis can be caused by many things, such as allergy, viral infections or bacterial infections, sicca (dry eye), irritation from excessive heat or cold or chemical solutions, or exposure to ultraviolet rays or foreign bodies.

Skin irritation and inflammation can be caused by allergies (drugs, foods), common scaling disorders such as atopic dermatitis (eczema, allergic component), psoriasis (genetic basis), seborrheic dermatitis and dandruff (may be reaction to yeasts), fungal infections of the skin (ringworm, jock itch, athlete's foot), and intertrigo (caused by effect of heat, moisture and friction). Other common causes are allergic contact dermatitis (due to irritants such as soap or detergents or an allergen such as poison ivy) and folliculitis due to infection, irritants, perspiration, and rubbing of fabrics on the skin.

Question 2. The Committee is aware that following notification by the Commander of the Indiana National Guard in late September 2003, an Army team arrived at Qarmat Ali to assess contamination of the site, to conduct an exposure assessment and to evaluate any potential health effects. Please comment on the methodology used to determine any potential risk associated with exposure, the amount of testing that was conducted and for what period of time the testing occurred.

Response. Soil sampling, ambient air monitoring (including breathing zone monitoring), and surface wipe sampling were conducted by the USACHPPM Team as part of the Deployment Occupational and Environmental Health Survey and Occupational Health Risk Assessment from 30 Sep–2 Nov 2003. Samples were collected by trained personnel that included certified industrial hygienists, environmental scientists with over two decades of contamination site assessment experience and enlisted preventive medicine technicians. Sampling and laboratory analytical methods were derived from those used during contaminated site and workplace assessments developed by the Environmental Protection Agency (EPA) and National Institute for

Occupational Safety and Health. Sample results were compared to the one-year Military Exposure Guidelines (MEGs) for air and soil. MEGs are concentrations for chemicals in air, water and soil that are used to assess the significance of an exposure to a contaminant. They represent a concentration above which certain types of health effects may begin to occur in a population after an exposure of a specified duration. They are guidelines and not health standards. When these guidelines are exceeded, they serve as an action level for additional investigation/study. They have been derived from existing regulatory guidance published by the EPA, Occupational Safety and Health Administration and other Federal agencies. Additional information can be found in USACHPPM Technical Guide 230, Chemical Exposure Guidelines for Deployed Military Personnel available at http://chppm-ww.apgea.army.mil/documents/TG/TECHGUID/TG230.pdf and the Reference Document (RD) 230 Chemical Exposure Guidelines for Deployed Military Personnel available at http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG230RD.pdf. Risks were estimated by determining the hazard severity and exposure potential in accordance with Army Composite or Operational Risk Management Guidance. Additional information can be found in USACHPPM Technical guide 248, Guide to Deployed Preventive Medicine Personnel on Health Risk Management available at http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG248.pdf. These were reviewed by the National Academy of Sciences Committee on Toxicology in 2004. This review is available at http://www.nap.edu/catalog.php?record_id=10974#toc.

Soil Sample Results. A total of 60 soil samples were collected in different areas of the Qarmat Ali site from 7–12 Oct 2003. Only one offsite area tested above the One-Year MEG for Total Chromium or Hexavalent Chromium [Cr VI] in soil. However, four areas of the site tested above the MEG for polychlorinated biphenyls (PCBs). The severity of this exposure was estimated to be Negligible due to the short exposure durations.

Air Sample Results. Eighty three breathing zone samples were collected 7–12 October 2003, 43 were analyzed for Cr VI and 40 for Arsenic, Chromium (Total), Lead and Selenium. Twenty eight area air samples were collected between 8–11 October 2003 and analyzed for Antimony, Arsenic, Beryllium, Cadmium, Chromium (Total), Lead, Manganese, Nickel, Vanadium, Zinc and Particulate Matter Less than 10 microns (PM10).

The survey's breathing zone and general area air sample results for heavy metals, to include Cr VI were well below the Cr VI MEG.

The majority of the sample results for PM10 exceeded the 1-year MEG of 70 micrograms/cubic meter. Although these results indicate that on-site personnel may have been exposed to concentrations greater than the MEG, they are consistent with PM10 concentrations experienced in and around US base camps located throughout Southwest Asia.

However, these sample results only estimated exposure conditions at the time of the survey (i.e., some post-containment of sodium dichromate-contaminated grounds had occurred, light winds blowing in an easterly direction, and limited oil well water injection operations) rather than past conditions (i.e., pre-containment of sodium dichromate-contaminated grounds and potentially high winds) and future conditions (i.e., potentially high winds blowing in a westerly direction and full-scale oil well water injection operations). Air concentrations prior to encapsulation were modeled using the EPA's Particulate Emission Factors model used in hazardous waste site restoration. This model indicated that Soldiers present at the site prior to encapsulation could have been exposed to Cr VI at concentrations greater than the MEG but lower than the OSHA Permissible Exposure Limit. The one year-MEG for Cr VI was much lower than the OSHA Permissible Exposure Limit in place at the time.

Surface Wipe Sampling. The survey's surface wipe sample results for Cr VI dust indicated that the interior of the contractor trailer located on the site was contaminated with Cr VI dust. These results also indicated a lesser degree of Cr VI dust cross-contamination from the Qarmat Ali Water Injection Facility (WIF) compound to the TF RIO work trailer (located in contractor's Pioneer Camp near the Basra International Airport). Although no occupational and/or environmental exposure limits currently exist for Cr VI dust, personnel living and working in the contractor trailer may have been overexposed to Cr VI dust unless properly protected. Recommendations were made to relocate the Qarmat Ali Industrial WIF's KBR trailer nearer to the western boundary of the compound, and thoroughly decontaminate the trailer with soap and water prior to reoccupation. The study also recommended that the work and living areas of personnel known to have been on the Qarmat Ali WIF compound be cleaned with soap and water to remove any cross-contamination residue.

Medical Evaluations. The comprehensive medical exams provided by the USACHPPM SMART-PM team consisted of a medical history, a general physical

exam, blood and urine testing (including red blood cell and serum chromium levels, complete blood counts, serum chemistries, liver and renal function tests, and routine urine analysis). Ancillary testing included chest x-rays and spirometry (pulmonary function) testing.

No nasal perforations or ulcerations were noted in any of the individuals examined. To evaluate exposure above the permissible levels in workplace settings, urine is tested before and at the end of the shift, or the end of the workweek, and increases are noted. This is because individuals can have different levels in their urine based on age, sex, smoking, and diet. As stated above, for these individuals, urine measurement would not have been sufficient to assess their exposure, and there were no available pre-exposure urines for comparison. The decision to test whole blood (plasma, serum and red blood cells) was made with this understanding, and reference values were obtained from the literature and the laboratory at the Armed Forces Institute of Pathology for comparison purposes. Most of these blood tests were below the detection limit of the laboratory test, and 100% of the tests were within "normal" reference ranges identified in the literature. Based on the collected information, there did not appear to be a concern that overexposure had occurred. Individuals were therefore at negligible risk for any long-term health effects from chromium exposure.

The medical evaluations supported the low to negligible overall long-term health risk, with only sporadic potentially-related minor health effects being observed.

Question 3. The Army has stated that a number of soldiers who were present at Qarmat Ali had the opportunity to be given a medical exam and have blood work tested for any abnormal levels of chromium. Results of this testing showed that blood chemistry for chromium was average. Given the Army has stated that it did not know National Guard Units from West Virginia, Oregon and South Carolina were present at the time of this testing and only tested those in the Indiana National Guard Unit, how can testing of the Qarmat Ali population be conclusive if a number of the Qarmat Ali population were not surveyed or tested?

Response. The Army assessment team provided comprehensive medical testing to those Soldiers and DA Civilian employees who were present at the site during the assessment. The Army knew of the presence of the South Carolina and Oregon Army National Guard at the site. The West Virginia Army National Guard unit (1092nd Engineer Battalion) was the only unit whose presence at the site was not known during the site and medical evaluation in 2003.

The Soldiers from the 1–152nd IN BN (INARNG) and DA Civilian employees from Task Force Rio reported the highest average time on the site. Soldiers that had served at the site prior to the assessment team's arrival from the 1–162nd IN BN (ORARNG) and the 133d MP (SCARNG) and had already departed were provided an exposure survey to estimate their overall exposure duration and frequency. These units were asked about the period of time that they spent at the site and they reported an average time on site of approximately 8.6 hours. Soldiers from the 1–152nd IN BN (INARNG) reported that they had spent on average147 hours on site. They did not show any specific signs of overexposure to chromium and the medical evaluations and site testing determined that they were not at an increased risk for future health effects. Since the 1–162nd IN BN (ORARNG) and the 133d MP (SCARNG) spent significantly less time on site than the IN NG units, the assessment team concluded that their exposure was considerably less than that experienced by the 1–152nd IN BN (INARNG) and any risk of future health effects was also minimal. This conclusion was validated by the Defense Health Board in their October 2008 review of the risk assessment

There was no official record of the presence of the 1092nd Engineer Co (WVARNG) provided to the assessment team. The presence of the 1092nd Engineers was identified during site visits to the 1–152nd IN BN and 1–162nd IN BN. Interviews with Soldiers from the 1092nd Engineers by a team from the office of the Assistant Secretary of the Army for Manpower and Reserve Affairs suggests that these soldiers were exposed for a similar duration and at a similar level to the 1–152nd IN BN (INARNG) Soldiers. Unfortunately, there is no testing that can be administered this long after exposure to determine the risk of future health effects for these Soldiers.

Question 4. The Army has stated that on average, soldiers spent 147 hours at Qarmat Ali. Given that any information in the surveys was self-reported, how can the Army guarantee the accuracy of these statements, in regard to the amount of time that was spent at Qarmat Ali? Were official unit records used to validate information that was given in soldiers' statements?

Response. There was no official system of records in place at the time of the incident that would independently document the amount of time a Soldier is present

at a site. Current policy now requires recording a Soldier's duty location during a deployment once daily. Exposure duration and frequency for Soldiers of the 1–152nd IN BN (INARNG) were determined from exposure questionnaires completed by individual Soldiers. This is a common technique used in the field of Industrial Hygiene. Only the Soldiers of the 1–152 IN BN (INARNG) reported the average exposure of 147 hours. The Soldiers of the South Carolina and Oregon Army National Guard units reported considerably less average exposure (8.6 hours).

Question 5. The Army has stated that all results of the aforementioned testing were included in the medical records of soldiers who participated. In addition, the Army has said that these soldiers were encouraged to discuss their results along with any health concerns, on their post-deployment health assessments and with their health care providers. Have these soldiers' medical records, in regard to any testing done in relation to potential exposure to sodium dichromate, been shared with any other organization or been added to any exposure database? Has any additional testing for sodium dichromate exposure been conducted on these individuals? Are these individuals currently being monitored?

Response. All occupational and environmental sample results from the site assessment have been provided to the Department of Veterans Affairs (VA) to include a by-name list of whole-blood chromium monitoring results for those Soldiers eligible for VA medical care. Since early 2009, the DOD Deputy Assistant Secretary of Defense, Force Health Protection and Readiness, has assisted in facilitating the USACHPPM attending and participating at quarterly scheduled DOD/VA Deployment Health Working Group meetings. On 14 May 2009, the USACHPPM presented a briefing to the Working Group entitled "Operation Enduring Freedom and Operation Iraqi Freedom Deployment OEH Incidents." This briefing contained a section on the Qarmat Ali Water Injection Plant incident.

The Assistant Secretary of the Army, Manpower and Reserve Affairs, in coordination with the National Guard Bureau has conducted extensive outreach to Army National Guard units who were at the site but were not evaluated. As of late September 2009, 1164 Soldiers were estimated to have deployed with the units who served at the site, 863 of these Soldiers have been contacted by their State Joint Force Headquarters, informed about the incident, and encouraged to enroll in the VA registry; 258 had enrolled in the registry; and 154 were reported to have had completed medical examinations provided by the VA.

The VA has established a separate registry for this incident. All of the Soldiers from this incident currently enrolled in the VA's Gulf War Registry will be added to this registry. As part of this enrollment, the VA will provide routine follow up examinations, to include x-rays, to monitor the Soldiers involved in the incident. The ARNG Joint Force Headquarters in each state will retain the medical records of the Soldiers to ensure that a second record of the exposure is maintained and available to the Soldiers.

There has not been additional testing done for sodium dichromate exposure. There are no medical tests that can detect exposure this long after the incident.

Question 6. The Committee is aware that in 2004, a report was issued by the Army with findings and recommendations in regard to the situation at Qarmat Ali and that report was subsequently sent to the Defense Health Board. Other than commenting that "the standard of care was exceeded" what other recommendations, comments or concerns did the Defense Health Board express with respect to this report? Was the report shared or critiqued by any other independent medical or scientific body, such as the Institute of Medicine?

Response. The Defense Health Board (DHB) provided 14 specific and general observations and recommendations on the study. These included such observations that while environmental contamination was present at the site, all available evidence indicates a low level of personal exposure and no expectation of future health effects. They also observed that Soldiers who were similarly exposed but not studied should be reassured that this finding applies to them as well. They also recommended that information about the incident be conveyed to medical providers and included in the involved Soldiers' permanent record and that this incident be used to train personnel in the best practices to address future similar incidents.

We did not seek additional outside review due to the time available and the fact that the chair of the DHB review also serves as the Chairman of the National Academy of Sciences Committee on Toxicology.

Detailed information on the DHB review is available at: http://www.health.mil/dhb/recommendations/2008/DHB%20Review%20of%20USACHPPM%20Assessment%20at%20Qarmat%20Ali%20Final%20Report.pdf.

Question 7. In Dr. Gibb's testimony, he noted that there were several data inconsistencies in CHHPM's report. Specifically, CHHPM's report cited test results that

showed that 98 percent of blood samples showed chromium levels within a range of 4 to 5 micrograms per liter in one area of the report, then CHHPM stated that nearly all results were below the limit of detection in another area of the report. How do you account for these inconsistencies in data in CHHPM's report?

Response. Dr. Gibbs's testimony contained a factual error. The CHPPM report states on page 15 that "The majority of test results were below the detection limit of the test method" and "All the results, to include the earlier tests done by KBR, were within the first reference range (0.2 to 10.0 μg/L) and 98% of the results were within the second reference range (4 to 5 μg/L)." Of the 135 tests done, 73 were below the level of detection of 0.5 μg μg/L, with the remaining ranging from 0.5 μg/L to a maximum of 8.7 μg μg/L. All were below 10 μg/L, meaning all were within the first range. Only two results (7 μg/L and 8.7 μg/L) were above 5 μg/L. It is common within the field of occupational medicine for results to be called "within normal limits" or within the normal range as long as they are not above the upper limit of the range. Dr. Gibbs incorrectly concluded that CHPPM had claimed that the results were between 4 to 5 μg/L.

Question 8. What type of surveillance, medical and otherwise, does the Army provide in areas where burn pits currently exist?

Response. Army preventive medicine personnel conduct initial occupational and environmental health surveillance to determine what potential environmental hazards may exist at a given location. These may include: toxic industrial chemicals and toxic industrial materials from local sources that may be in the air, water, or soil; ionizing radiation; non-ionizing radiation; physical hazards such as extreme noise, heat and cold, and altitude; food-, water-, vector-, and arthropod-borne threats; endemic diseases; and any by-products of US forces activities (noise, smoke from burn pits, exhaust, etc.). The results are documented in a site-specific Occupational and Environmental Health Site Assessment. Identified hazards are assessed for potential impact on the mission and for long-term health concerns. The hazards are eliminated, reduced or otherwise controlled as feasible within mission constraints. Surveillance is conducted when hazards cannot be eliminated and a decision is made by commanders to accept the health risks associated with the exposure situation. Surveillance relating to burn pits can include ambient air sampling, surface soil sampling, and reviewing medical encounter data.

Soldiers (and other Servicemembers) are asked to discuss any concerns that they have about burn pits or other environmental exposures with a health care provider as part of their mandatory post-deployment health assessment process. This assessment is a two-step process that occurs within 30 days of their return from a deployment and again within 6 months after their return from deployment. Specific information on this program and the survey forms is available at http://afhsc.army.mil/Documents/DOD_PDFs/DODI_6490_03.pdf

Question 9. When will additional environmental assessments from burn pit sites, in addition to the one already done at Balad, be conducted?

Response. A tri-service group is developing an air sampling strategy for the CENTCOM AOR, focusing on sites with significant air pollution sources such as burn pits. The group is considering potential air hazards, methods to collect samples in a deployed area, and how such data could be used to better characterize the air and the health risk to deployed Service Members. Personnel from the group are traveling to 6 locations in Iraq and Afghanistan in early November 2009 to brief command personnel on historical air sampling results, discuss the current situation with medical personnel, and gain further understanding of the exposure situation and concerns. Upon return, the draft sampling strategy will be updated and presented to the Joint Environmental Surveillance Work Group Executive Committee in late November 2009. It will then be reviewed by the Defense Health Board at the end of November 2009. Sampling is expected to begin in early 2010, assuming that operational security considerations are sufficient to allow this to occur safely.

Question 10. What other environmental exposures is the Army currently monitoring?

Response. Currently, Army preventive medicine personnel are conducting occupational and environmental health surveillance to determine what potential environmental hazards and risks exist at all large US Base Camps in Iraq and Afghanistan. Surveillance includes periodic sampling of ambient air quality, potable and non-potable water sources, and contaminated soil. The results are documented in a site-specific Occupational and Environmental Health Site Assessment. Since 2001, more than 17,000 environmental samples have been collected throughout the CENTCOM Area of Operations with almost 10,000 in Iraq, more than 3,500 in Kuwait, and 3,300 in Afghanistan.

Question 11. What preventative measures are taken by the Army before it sends soldiers into areas where there are potential environmental hazards?

Response. The preventive measures undertaken by the Army prior to deployment are addressed in Army Regulation (AR) 11–35, Deployment Occupational and Environmental Health Risk Management, Headquarters Department of the Army, 16 May 2007. These include an assessment of occupational and environmental health hazards such as industrial chemicals, hazardous noise levels, or radiation or other hazard present or being generated by local national agricultural, industrial, or commercial activities. Ideally, these assessments are completed pre-deployment as part of an Occupational and Environmental Health Site Assessment or an Environmental Baseline Study prior to the establishment of a forward operating base or other deployment location. These considerations are included in the Army composite risk management process to balance mission risks when developing contingency and operational plans. Operational planners attempt to identify these hazards as part of the overall intelligence preparation of the battlefield but they are often unable to obtain the needed data prior to US Forces occupation of a site. As a result, a primary component of the DOD/Army Deployment Occupational and Environmental Health Risk Management program is the principle of hazard recognition and avoidance. Commanders at all levels are required, by DOD, Joint Staff and Army Policies, to ensure that Occupational and Environmental Health hazards are identified and assessed during periodic monitoring as part of their overall composite risk management plan for the operation, similar to the risks from combat, CBRN attacks, and physical safety hazards.

RESPONSE TO POST-HEARING QUESTIONS BY HON. RICHARD BURR TO JOHN J. RESTA, PE, MS, SCIENTIFIC ADVISOR, U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

Question 1. At the hearing, Mr. John Resta indicated that the Department of Defense may be moving forward with additional air sampling and studies regarding the potential health effects of burn pits being used in Iraq and Afghanistan.

A. Please provide additional details regarding any on-going or planned air sampling related to burn pits.

Response. Air sampling for Particulate Matter is being conducted across Iraq and Afghanistan at locations with deployed preventive medicine personnel which includes most of the larger US base camps. Sampling for volatile organic compounds (VOCs) is also being performed because of burn pits and other sources of VOCs at the base camps such as generator and vehicle exhaust.

A tri-service group is developing a comprehensive air sampling strategy for the CENTCOM Area of Responsibility, focusing on sites with significant air pollution sources such as burn pits. The group is considering potential air hazards, methods to collect samples in a deployed area, and how such data could be used to better characterize the air and estimate the health risk to deployed Service Members. Personnel from the group are traveling to 6 locations in Iraq and Afghanistan in early November 2009 to brief command personnel on historical air sampling results, discuss the current situation with medical personnel, and gain further understanding of the exposure situation and concerns. Upon return, the draft strategy will be updated and presented to the Joint Environmental Surveillance Work Group Executive Committee in late November 2009. It will then be presented to the Defense Health Board at the end of November 2009 for their review and comment. Sampling is expected to commence by early 2010 assuming operational security conditions are adequate to allow this to occur safely.

B. Is on-going sampling being done near the living quarters of servicemembers in Iraq?

Response. Air sampling locations associated with burn pit smoke are selected by deployed preventive medicine personnel based on their assessment of air hazards and their impact on the mission and potentially affected populations. These sampling locations frequently include living areas.

C. Would you please provide a timeline of when additional studies will be initiated and when we can expect the results?

Response. As discussed above, additional burn pit studies would be expected to begin in early 2010. The actual dates may be affected by: equipment purchase and shipping, training, coordination of laboratory assistance, personnel rotation schedules, and/or the operational situation at the locations of interest. Results would be anticipated 3–6 months after the completion of field work.

Question 2. A February 2009 article in "Inhalation Toxicology" written by employees from the U.S. Army Center for Health Promotion and Preventive Medicine noted

that authors of a 2005 journal article had "conducted a survey of 15,000 military personnel deployed to [Operation Enduring Freedom/Operation Iraqi Freedom] and estimated that 69.1% reported experiencing respiratory illnesses, of which 17% required medical care," and that "[t]he frequency of respiratory conditions doubled from a pre-combat period to a period of combat operations in this group."

A. What steps are being taken to ensure that possible respiratory illness is addressed in post-deployment health assessments?

Response. Soldiers (and other Servicemembers) are asked to discuss any health concerns that they have about burn pits or other environmental exposures with a health care provider as part of their mandatory post-deployment health assessment process which is a two-step process that occurs within 30 days of their return from a deployment and again within 6 months after their return from deployment. Specific information on this program and the survey forms is available at http://afhsc.army.mil/Documents/DOD_PDFs/DODI_6490_03.pdf.

The increase in respiratory conditions in theatre noted in the article occurred during deployment by analyzing these post-deployment self assessment data. Soldiers' self-reporting of symptoms on questionnaires seems to increase from pre-to-post-deployment, but the increase is not reflected in more objective measures of health status, namely health care encounters. CHPPM has assessed the frequency of post-deployment inpatient and ambulatory care visits for respiratory conditions, and not found them to be associated with deployment (i.e. number of deployments and cumulative time deployed).

B. To what extent does the smoke from burn pits potentially contribute to respiratory health problems of deployed servicemembers?

Response. It is not possible to state to what extent any one exposure contributes to "respiratory health problems of deployed servicemembers." It is recognized that exposure to burn pits smoke can cause acute, short-term and, most often, mild respiratory health problems in servicemembers such as red, watery, and mild upper system symptoms, depending on the degree of smoke exposure, such as coughing and sinus congestion. It is also suspected that a fairly small number of personnel who may have preexisting respiratory conditions may have those conditions aggravated by smoke exposures, or because of special susceptibilities, unique medical histories, or possibly even as a result of combined exposures (such as use of open burning and smoking cigarettes or cigars, etc.) could develop some type of chronic health effects. What are not known is what conditions might fall into this category and how frequent such conditions may develop. Epidemiologic studies are underway to identify any associated conditions and the extent of any risks toward the development of long-term, chronic conditions. The studies conducted to date have not demonstrated a significant increase in respiratory health outcomes post-deployment. Additional epidemiologic studies are underway to identify any associated health conditions and the extent of any risks toward the development of long-term, chronic conditions.

Question 3. In his testimony, Mr. Resta indicated that the U.S. Army Center for Health Promotion and Preventive Medicine and the U.S. Air Force School of Aerospace Medicine "performed both an operational health risk assessment and a long-term health risk assessment based on large-scale sampling events at Joint Base Balad" and that "no environmental monitoring data collected at Joint Base Balad to date have identified an increased risk for long-term health conditions."

A. Can you explain the extent to which the presence of particulate matter was considered in reaching that conclusion about long-term health conditions?

Response. The risk assessment conclusions for the burn pit health risk assessments were based on the chemical test results and did not consider particulate matter (PM) exposures primarily because a CENTCOM-wide PM characterization study was in progress during the time of the risk assessments and the potential health effects of PM exposures are not well understood. USACHPPM has requested that the National Academy of Sciences evaluate the existing PM data set and provide recommendations on assessing the health risks from exposures to PM. This evaluation is ongoing and expected to be completed in 2010.

B. What impact do open burn pits potentially have on particulate matter levels?

Response. Products of combustion include particulate matter, which is a broad term for particles which can be inhaled and include acid aerosols, metals and other compounds. Thus, burn pits add particulate matter to the surrounding air and potentially raise particulate matter levels. However, PM levels at Balad and across the region are naturally much higher than those found in the US. The year-long sampling effort for the CENTCOM-wide PM characterization study showed PM levels at Balad were similar to other locations in the region, some of which had burn pits and some that did not.

C. Would you explain the findings that were published in "Inhalation Toxicology" in February 2009 with regard to the health effects of exposure to particulate matter

(article entitled "Potential Health Implications Associated with Particulate Matter Exposure in Deployed Settings in Southwest Asia") and what impact those findings may have on your conclusions regarding the long-term health risks associated with open burn pits?

Response. The article was a review of some of the health effects associated with particulate matter, and specifically, what has been published regarding potential relationship of particulate matter in military populations. Based on the literature to date, no clear consensus regarding long-term health risks associated with particulate matter in deployed settings has emerged. Thus, the article discusses potential health risks. The article identifies burn pits as a potential source of particulate matter, and notes that burning and products of combustion may contribute to long-term health effects.

Chairman AKAKA. Thank you very much, Mr. Resta.

My first question is for all of the DOD witnesses. I am really interested in the timeline for each of the exposures. So, General Payne, tell me about Camp Lejeune. When did the Marine Corps first learn about some potential problems there and when were your VA partners and servicemembers first notified about that?

General PAYNE. Sir, there was an indication, I am told, in approximately 1979 that there were VOCs that were interfering with the testing of the water. But our ability to determine the specific chemicals involved took several years.

Once we found out the specific chemicals, the specific wells, we began shutting down those wells in late 1984. The first notification was through the base newspaper and I have no idea, sir, why that route was chosen. Looking back from 2009, it seems to me to be a very inadequate response and an inadequate notification, quite frankly. I cannot speak for why the decision was made at that time in late 1984 and again in 1985 to use that means of notification of the potentially affected residents.

Chairman AKAKA. The same question I would like to ask of Dr. Gillooly. Can you share the timeframe for Atsugi?

Mr. GILLOOLY. Yes sir. As mentioned in my introductory remarks, the incinerators were constructed in the early 1980s. They were burning municipal waste. They applied for a permit to burn industrial waste in 1985. I think that was when the first concerns arose. There were some studies done by other organizations within the Navy, not Navy Medicine, in the late 80s and early 1990s. We were not involved in those studies.

We were tasked, or asked rather, in 1994 to come in and look at what had been done and at that point, we had done a screening risk assessment. So, that is when we first became aware of the air emission problems, then wrote a fact sheet and began some risk communication on base at that time.

We followed that up in 1997 with another screening risk assessment using data that was primarily collected, not by us, but for compliance purposes, and each time we recommended that we go to a full comprehensive risk assessment study that would involve a year-long study of the air pollutants. In other words, we would sample for the whole year.

As you are aware, the Department of Justice filed suit, I believe, in 1999–2000, against the incinerator complex and it was closed in 2001.

Chairman AKAKA. When were your VA partners notified about this or the other servicemembers?

Mr. GILLOOLY. Pardon? Could you repeat that, please? I did not hear that. When was——

Chairman AKAKA. Yes. When was this information passed on to VA?

Mr. GILLOOLY. Well, to my understanding, this year. In fact, there was a formal presentation to the VA about the Atsugi retrospective cohort epidemiological studies. So, I think, to my knowledge, that is the first formal presentation to the VA.

Chairman AKAKA. Mr. Resta, your timeline in Qarmat Ali and the burn pits, when did the problems come to light and when were your servicemembers and VA notified?

Mr. RESTA. For Qarmat Ali, my organization became aware of it on 15 September 2003, when we were contacted by the Coalition Forces Land Component Command, also known as CFLCC. CFLCC, on about the same day, also put the site off limits for all U.S. military personnel.

We deployed and arrived on 30 September, started our field work, completed our study in November 2003, and published a report in January 2004, which was classified at the time in accordance with CENTCOM classification guidance. Between 2005 and 2007 there were several informal contacts between members of my organization and various physicians within the VA asking questions about the incident.

The first formal data transfer was of the classified report in December 2008, and then we subsequently prepared an unclassified report that was provided to them in January 2009.

In terms of burn pits, our first involvement with burn pits occurred in 2004 at Camp Lemonier in Djibouti on the Horn of Africa, where we conducted our first study.

We identified the risks at Balad as part of an occupational and environmental health site assessment in the 2006 timeframe, we started conducting environmental sampling there in 2007. That environmental sampling continues with certain periodicity today, and we started providing informal—at the technical level between physicians—information on that to the VA probably as early as 2007.

We provided formal information to the VA in May of this year. They have gotten all the data to date that we have—all the sampling data that we have on Joint Base Balad to date.

Chairman AKAKA. Thank you. Let me ask Dr. Postlewaite if you have any further comments on this.

Mr. POSTLEWAITE. I think the timelines are accurate, sir. I have nothing to add to that.

Chairman AKAKA. Dr. Peterson, what happens when information about exposures arrives at VA's doorsteps; and Dr. Hunt, do you begin to assess the health of a veteran who has served in an area where exposure is known to have occurred?

Dr. PETERSON. Mr. Chairman, I would reference my opening statement about the DOD/VA Deployment Health Work Group. As other witnesses have explained on the DOD side, that has become the venue in the last few years of both discussions related to exposures and a venue for the transfer of information to include things like lists of potential people exposed.

When through that working group the VA is notified, we have a discussion with others at the Health Work Group, and internally

to VA, concerning the appropriate course of action. What do we feel based on work done by DOD up to that particular period of time in terms of exposure, how much of a risk is there?

We identify methods by which to communicate with both veterans and providers that the exposure has occurred and what they need to be concerned about from a provider's perspective; from the prospective of care and where necessary, we begin to conduct medical surveillance and provide appropriate health care as authorized under statutory authority.

I think Dr. Hunt can provide us a very interesting perspective in terms of what you have asked him to do and also to kind of balance out what I said in terms of when that information is provided to our providers in the field, when veterans become aware and start asking questions, how those questions are addressed, and how the care is handled at that point.

So, I will ask Dr. Hunt to address that.

Chairman AKAKA. Dr. Hunt?

Dr. HUNT. First, I would like to thank the Chairman and Ranking Member for the invitation to come speak with you today, as well as the staffers. I commend you on the work that you are doing.

I feel like I am sitting here with 3,000–3,500 veterans that I have seen over the years. I am a primary care physician, occupational environmental medicine trained, and have done many hundreds of Gulf War registry exams, Agent Orange exams, Project SHAD exams, and ionizing radiation exams. I have sat with many of these veterans and feel like I will try to represent today their needs and their experiences.

I cannot get the stories out of my head that Stacy told today and Laurie and Russell. I think of Senator Burr's friends, Jerry and David. Day in and day out, I sit with these individuals that have concerns about environmental agent exposures. I feel like there are two very important kind of paths that these situations take.

If we have a situation like Qarmat Ali, Camp Lejeune, where we have what seemed to be fairly clear exposure incidents, I feel like we are putting in place both through the work in the DOD and CHPPM and the Office of Public Health Environmental Hazards with our risk centers, a very nice approach that—I wish Senator Rockefeller was still here because it is still not where we want it to be. But we are really moving in the direction of being able to take care of these incidents in a way that more quickly provides relief for these veterans and their families.

Many of the people that we see—I think of Senator Burr's comments—have situations where we still do not have the answer, or situations where we are waiting for science. Tuesday, going to clinic, I ran into a Gulf War veteran that I had not seen for 6 or 7 years. I had done his initial Gulf War registry exam back in 1994 or 1995. Hadn't seen him for a long time. He was doing great. He had been down to Florida. He was being seen in a VA down there.

We had a short chance to talk and I thought, he is really doing well, this fellow. When he first came in, he had medically unexplained symptoms, as 20 percent of the veterans from the first Gulf War did. We still do not know exactly what that is about. We still do not fully understand it.

But what we do know is that there are many things we can do to help these veterans before we fully understand everything that is going on in terms of direct associations between exposures and health problems.

So I guess to answer your question, what we try to do when a veteran comes in is to first of all acknowledge their service, acknowledge their sacrifice, take a step back from the chief concern about the exposure and the health concerns and reassure them that we will be spending time on that, but to take a step back and look at the greater context of their needs and their situation, particularly combat veterans.

These exposures in combat particularly are a part of a very complex matrix of exposures that have to do with environmental agents, psychological traumas, sleep deprivation, and all the other potentially deleterious experiences a person has in combat.

So, we try to assess kind of the full spectrum of risks that this person has been exposed to. We try to put the assessment of their environmental exposures in the context of that overall risk. We try to get the services set up that they need, including getting them service connected, getting them benefits, getting them the support that they need so that even before we know the answers to is this particular symptom related to this particular exposure, there are a lot of things we can do to help them get back on track and get back on their feet, particularly combat veterans.

Chairman AKAKA. Thank you very much, Dr. Hunt. Senator Burr, your questions.

Senator BURR. Thank you, Mr. Chairman. I apologize to the witnesses that I was not here to hear the testimony, but I have tried to go over it as best I could.

Let me go to you, Dr. Peterson, and to any of your colleagues from the VA that feel appropriate to potentially answer. The Navy sent out letters to veterans stationed at Camp Lejeune between 1957 and 1987, encouraged them to participate in the health registry. To date, roughly 140,000 individuals have responded and it is reasonable to conclude that many responded because they are in fact suffering from health problems and are worried they could be linked to the service at Camp Lejeune.

Has the Navy or the Marine Corps volunteered to share the names, addresses of those individuals with the VA potentially so the VA could let them know whether they are eligible for VA care? In other words, have they provided the registry to the VA?

Dr. PETERSON. Yes, in fact, the VA is providing veterans with information about this issue and offering contact information and referrals to a registry that the Navy has established in the past. So we have—the Navy has been proactive in——

Senator BURR. The 140,000-plus name registry has been provided to the VA?

Dr. PETERSON. Yes.

Senator BURR. OK. Has the VA proactively gone after those 140,000 individuals to counsel them relative to their potential benefits within the VA system?

Dr. PETERSON. We make the benefits aware to all of our veterans in a variety of ways. We have not specifically targeted that group. What has happened, coincidentally, with working issues like in-

forming our veterans and going after them and indicating what benefits there are available to them, we have also——

Senator BURR. They have responded to a Navy/Corps notification that they were at Camp Lejeune over a period of time where they potentially were exposed to toxic substances in the water. That list of people who responded and said, I acknowledge I was there, I might have a concern, has been supplied to the VA, but we do not do anything proactive from a standpoint of the VA to reach out to those individuals?

Dr. PETERSON. No, we do reach out proactively. I guess the point I am trying to make is while we are in the process of beginning to do that, we are also finding out that the National Research Council has produced a document, as was talked about earlier on the first panel, that indicates from their findings that we need to move forward in terms of research. Having been accomplished, there is no more research that indicates any more studies need to be done. This is a finding of the commission.

Senator BURR. Dr. Peterson, seriously, I do not want to get into the NRC results with the Veterans Administration. I look at the VA from the standpoint of the agency mandated to provide service, health care service specifically, and you have thrown me a curve ball because the VA says and the Marine Corps says they have never—the Marine Corps says they have never given the VA registry the registry, and the VA says they have never gotten the registry.

For you to tell me that you have the registry is something new.

Dr. PETERSON. OK. Brad, did you want to answer that?

Senator BURR. Mr. Mayes, would you like to clarify that?

Mr. MAYES. Senator—I think I turned it off there. I am not aware and I can speak for what we have done in the Benefits Administration, that we specifically have the names to conduct the outreach. We have been made aware of the situation at Lejeune.

What we have done on the benefits side of the house is we have gone out and tried to make our field personnel sensitive that you are going to start seeing veterans coming into our regional offices——

Senator BURR. Let me ask a real specific question.

Mr. MAYES. Yes, sir.

Senator BURR. To whoever would like to take it. Have you taken whatever list you think has been provided for you and compared it to the veterans that are enrolled within the VA system to see who might already be enrolled, receiving services from the Veterans Administration, where it would be extremely beneficial to that veteran for their doctor to know that they were potentially exposed to toxic substances at Camp Lejeune in their treatment?

Mr. MAYES. Sir, the short answer is I do not think we have the registry with all of the names. So to my knowledge, we have not matched that up.

Senator BURR. Well, let me go to the logical next question.

Mr. MAYES. I know what it is.

Senator BURR. Isn't that essential to the performance of your job, the delivery of health care to individuals, just if we limit it for a second to the ones who qualify for VA benefits? I mean, Dr. Hunt, I know exactly what you were saying earlier. Having as much in-

formation about the individual you are treating gives you specific insight as to the treatment therapies that you might pursue, knowing where they were exposed to the same thing if it is two—if it is one place versus the other might give you insight.

Based upon others you have seen, to me, it seems like an issue that the VA would actually be proactive with the Corps and the Navy, saying, we need this to do our job. The more information we get, the more effective we can be at the treatment of these individuals.

Let's forget the ones that do not know whether they qualify today. Does that—am I right there?

Dr. HUNT. [Nodding affirmatively.]

Senator BURR. I take the shaking of the head in the affirmative—OK. Dr. Peterson, in your testimony, you state that the VA does not have special authority to enroll Camp Lejeune veterans and their family members in the VA health care system.

As you know, I have introduced legislation that would explicitly authorize the VA to care for veterans and family members that show illnesses that might be the result of their time at Camp Lejeune. It appears to me that the VA could create a special enrollment category for those affected veterans using the Secretary's general authority to provide needed health care to categories of veterans not specified in law.

Does the VA have such legal authority?

Dr. PETERSON. I can't answer that question without asking general counsel. I do not know. I do not know.

Senator BURR. Could I ask you to take that to the general counsel?

Dr. PETERSON. I would be happy to, sir.

[See Question 1 in post-hearing questions by Senator Burr.]

Senator BURR. I think you will find out the answer to that is affirmative.

Dr. PETERSON. OK.

Senator BURR. And if that is the case, and I will not pose this in the form of a question, I will pose it in the form of a statement. Why would we rather wait to see if I pass legislation versus initiate the authority of the Secretary to create through that general authority the coverage for individuals that we fear might have a condition which is the result of having served at Camp Lejeune during a period that the groundwater was contaminated to a degree yet to be determined, OK?

Mr. Mayes, I cut you off earlier and this question might go to the heart of it, and I will let you answer in a complete statement. If veterans who were stationed at Camp Lejeune, have evidence that they have one of the diseases that might be the result of that contaminated water, how does VA evaluate a disability claim for an individual who might fall into that matrix?

Mr. MAYES. Yes sir, I think I understand the question. At the present time, we need evidence, of course, that they have a disease and then we would put them at Camp Lejeune, which we would certainly not question if they were at Camp Lejeune during the affected period, that they were clearly exposed to whatever was in the water—they would be drinking and bathing and using the water.

And then we would be looking for a medical nexus opinion between the disease and exposure to some toxic substance that might have been in the water. At the present time, that is required for service connection in those particular cases.

Senator BURR. If I happen to visit any VA facility in the country, how familiar would that person who sees that veteran coming in—that doc in that facility—be about Camp Lejeune potential contamination if in fact they found somebody that met that criteria; would the average person out there even know anything about it?

Mr. MAYES. The average adjudicator out there should know about it, Senator. We have a monthly call with all of our field managers that manage those veteran service centers that adjudicate those claims. It was in June that we made all of those managers aware that this was an issue.

We had anecdotal evidence that people were coming in and filing claims, that they needed to be sensitive to this and then, in fact, they had to sympathetically view those claims, order an exam if it is necessary, but at the end, they would still need the disease exposure at Lejeune and then that nexus opinion.

Senator BURR. I take for granted somewhere there exists a memorandum stating that information to them?

Mr. MAYES. Sir, we have not put it in a formal, what we call a fast letter, which would be guidance. We do document—we do document what we say on those calls.

Senator BURR. I feel fairly confident you will after this hearing.

Mr. MAYES. Yes, sir.

Senator BURR. Therefore, I would like you to send me a copy of it when you do.

Mr. MAYES. Will do, Senator.

Senator BURR. For the purposes of the Committee.

Mr. MAYES. Yes, sir.

Dr. HUNT. Senator?

Senator BURR. Yes, sir?

Dr. HUNT. On the clinical side, we—that information is being disseminated. Two weeks ago we had a conference on post-combat care in the VA. There were 3,000 people that attended from around the country. It is the biggest conference the VA has ever had.

There were several sessions at the conference that were done by the Office of Public Health Environmental Hazards, including one talking about Camp Lejeune and these other four exposure incidents as well. Also, we have monthly conference calls for this post-deployment in-grade care initiative and the one next month is done by the War-Related Illness and Injury Study Centers to further disseminate information to clinicians in the field about Camp Lejeune and these other exposure incidents.

There is also a monthly conference call through the Environmental Hazards Group where they discuss this too. So, clinicians certainly are getting the word about these veterans. So, if they come in, at least clinicians are increasingly aware of.

Senator BURR. Thank you for that, Dr. Hunt, and thank you for noticing that I blurred the line between disability back to medical care, unintentionally, but I am glad that I did so that you could sort of fill me in on that.

Mr. Chairman.

Chairman AKAKA. Thank you very much, Senator Burr. This question to Dr. Hunt builds on what Senator Burr was asking about.

VA has said that records are shared between DOD and VA for purposes of adjudicating claims, but what about for the purpose of providing health care? The bottom line is, can a VA doctor look at a veteran's health record and tell what environmental hazards they were exposed to during their deployment?

Dr. HUNT. One of the advantages of having been in the system for a period of time is knowing how absolutely absent that sort of communication was in the past. There is no question that we are moving forward with bidirectional health information exchange, with remote data access.

I confirm the chart when I am seeing a patient. I can click on remote data. I can get data from Fort Lewis or from military treatment facilities and among those data are information from the Post-Deployment Health Reassessment, PDHRA, which has information on exposure, and that is very useful for sure.

So we are increasingly gaining access to those sorts of records that are very helpful.

Chairman AKAKA. On the question of Qarmat Ali, Dr. Postlewaite, in your written testimony you called DOD's response to the exposures at Qarmat Ali exemplary. How would you characterize DOD's efforts to prevent exposures there? Specifically, how did your program help soldiers and workers at the water treatment plant?

Mr. POSTLEWAITE. Thank you, Senator. Actually, that testimony you quoted is Mr. Resta's, but I would like to take an opportunity to address your question, if I may. The word "exemplary" that was used in that testimony was a quote from the Defense Health Board when they reviewed the Army medical response to Qarmat Ali. They found it to be timely based on the minimal time since notification.

The Army was able to put together a team of experts, including occupational health physicians, get them into theater. This was in 2003. This is a very difficult time because we were very much engaged in hostilities at that time. This is out away from the base camp, where there wasn't lots of protection.

But nevertheless, the leadership said go for it and they were pulled in very, very quickly. The environmental assessment was done very quickly, as well as the medical assessment. We felt that under very extraordinary circumstances it was a very timely response.

Chairman AKAKA. Dr. Postlewaite and Mr. Resta, Dr. Gibb stated that the symptoms that have been reported by soldiers and civilian workers at Qarmat Ali are consistent with what has been experienced by other workers similarly exposed. He also said that blood samples were not taken until 1 month after remediation measures were taken to limit the exposure and that kind of delay does not allow for an accurate measure of exposure.

How confident are each of you that you have properly identified servicemembers' risk of exposure at Qarmat Ali?

Mr. POSTLEWAITE. This is a very complex situation with Qarmat Ali, Senator Akaka. Again, in 2003 when this occurred, the Army

came in very quickly, did the assessments on the individuals that were currently assigned there at Qarmat Ali, became aware of some units that had been there previously, felt after the environmental assessment was done, taking a look around the area, interviewing the troops and during that time, I think as is in the reports that you all have read, there were some symptoms noted primarily related to dried nasal membranes and upper respiratory kinds of symptoms that would be very consistent with the desert environment.

At that point in time, the team had no knowledge at all of these severe effects that have been coming out in the media over the last year since KBR raised these issues. That was not brought up at the time. So, based on the information that was available when those assessments were done, including the blood chromium, which we felt was the correct test because it measured the chromium in the red blood cells (which stays around longer), the hexavalent chromium that you would find in the serum, based on symptoms and based on the physical exams that were given, and based upon the blood samples that were drawn at the time, we felt very confident that we had fully assessed the situation and that there were no reasons to suggest long-term health effects.

As I said, we now have additional information and we are certainly reopening our book on this to take a closer look and we are very interested in what the VA physical exams will show for these individuals to see whether those health symptoms that they were experiencing may be consistent with these exposures.

This caught us very much by surprise because we did not have all that information. We had an individual this morning, the medic that spoke to us, who indicated that he took care of treatment for a number of the people in his unit, which was very valiant of him, but it may have prevented some of that information related to health effects from actually getting back to the medical facility where people could start putting two and two together to identify a real problem.

So, there are a lot of complex issues to this that are not easily navigated.

Chairman AKAKA. Mr. Resta?

Mr. RESTA. If I could just add a few things, sir, is that the physician that ran this response is a board-certified occupational medicine physician who works in industrial situations for the Army and is well versed in occupational medicine.

Through his physical examinations and ancillary testing—not solely blood chrome levels, but including pulmonary function tests, chest x-rays and things like blood and urine and liver functions and the like that are outside of my area of expertise—he concluded that the symptoms that veterans or soldiers at that point were complaining about, the signs that he observed, were not consistent with hexavalent chromium exposure.

Dr. Gibb's testimony had a few factual errors in it, which makes me believe we need to share some information with him. The blood chemistries that we did for chromium, 73 of 135, were less than the level of detection, which was 0.5 micrograms per liter, not 5 to 6 micrograms per liter, as he testified.

Twenty-one of 135 were in excess of 1.0 micrograms per liter with a maximum detected of 8.7 micrograms per liter. And these are well within U.S. national averages. At the time we were using a national average range of 0.1 to 10 micrograms per liter. But the blood tests alone—just to clear up potential confusion—the blood test alone was not the sole determination of whether or not a significant exposure had occurred. It was predominately the physical examination by the occupational medicine physician. And so I just wanted to clear that up.

Chairman AKAKA. Before I yield to Senator Burr, I would like to ask this question on burn pit exposures. Dr. Postlewaite——

Mr. POSTLEWAITE. Yes, sir.

Chairman AKAKA. We have heard stories about servicemembers experiencing medical difficulties due to service near burn pits in Iraq and Afghanistan. For several years now we have known this. What active measures does your office take to ensure the environmental safety of our servicemembers around the areas of these burn pits?

Mr. POSTLEWAITE. Yes, sir. Burn pits, as you probably know, were utilized at a number of camps within Iraq and also Afghanistan for an expedient means to dispose of waste that was generated at those camps, so that the waste itself would not generate a health hazard.

Unfortunately, some of these burn pits were located quite close to the camps, in some cases, upwind of the camps. Some of that was due to the fact with hostilities in the area the commanders did not feel like they could locate them very far away from the installations without putting their people at risk.

In other cases, the burn pits were located in the periphery, but as the base grew in size, the population expanded around it. As a result, we have a number of situations like this in-theater. The largest burn pit in theater, Balad Air Base, at the time was the one that was most easily studied. We could study it without putting people out in the far reaches of the territory where their protection would have been an issue.

We felt that, because it was the largest burn pit, this one would be a good one to study in depth because we felt it would be representative of the others. There were over 400 air samples that were taken at Balad Air Base in 2007, constituted the data necessary for a risk assessment as well as an addendum.

Both the addendum and the risk assessment looking at all the substances that were analyzed did not indicate a health risk. We took that information, that risk assessment, and had it reviewed by the Defense Health Board because we wanted third-party validation that our interpretation was correct.

Nevertheless, we do feel like some people probably have suffered some untoward health effects as a result of it. We do not feel like the numbers are large based on the total numbers of people that probably were exposed to smoke throughout the theater. In fact, the Post-Deployment Health Assessments that were mentioned earlier, I believe the figure that I saw last was about 56 percent of all the individuals deployed actually checked that square on the Post-Deployment Heath Assessment.

So, it was a very wide exposure. We have looked at our health outcome data from our returning veterans. We just are not seeing any significant elevations of the kinds of conditions that we would expect as a result of exposure to the smoke. But with that said, we are continuing to peel back the layers of the onion, if you will. We are doing site-specific studies on just the troops who were at Balad, for example, to see if their health experience was any different.

Right now we do not have any strong evidence to suggest that this smoke affected large numbers of people, but we really do feel like some people probably had increased susceptibilities. They may have had combined exposures. They may have had previous health conditions which would place them at greater risk.

So, we will not say that nobody is suffering from these exposures.

Chairman AKAKA. Let me follow up with Mr. Resta. According to your testimony, the risks of burn pits were recognized as far back in Bosnia in 1996. Were the soldiers located near burn pits in Iraq and Afghanistan issued any protective gear or warned in any way of the potential harms associated with burn pits?

Mr. RESTA. I am not aware that there was any specific personal protective equipment that was ever issued to any soldiers. I have heard anecdotes, stories of soldiers who were immediately downwind pulling guard duty wearing dust masks and things like that to essentially try to reduce the smell per se. But I am not aware that we have ever issued anything there.

In terms of notification, once we got the results of the first risk assessment, we tried, again, to communicate those risks to the people present at Balad via various town hall meetings, fact sheets, and the like. The challenge of doing that in such a large operational setting is that a lot of the people who had previously been there were no longer there, new people were there, and the situation and conditions had actually changed.

That is one of the reasons that we embarked on additional sampling and continue to do that today even while we are operating incinerators, which in the last report I received has reduced the amount of open burning by over 90 percent.

Chairman AKAKA. Thank you. Senator Burr.

Senator BURR. Thank you, Mr. Chairman. General Payne, welcome, and let me say for the record upfront, when this controversy at Camp Lejeune existed you were not in your capacity today.

Now, I have in my hand, as do probably numerous people, Base Order 5100.13B which is entitled, "Safe Disposal of Contaminants and Hazardous Waste," specifically prohibiting the improper disposal of, and I quote, "organic solvents" and defined improper practices as those, and again I quote, "create hazards such as contamination of drinking water."

Now in your testimony, I interpreted what you said to mean the Marine Corps did not violate any regulations. I guess I have to ask, is not complying—how does not complying with the base order square with that?

General PAYNE. Sir, again, looking back with the lens of 2009, you look at that and one just shakes their head as to how this happened based on the timeframes. I think that you have to start with understanding that even in 1984, when we started closing the wells

in early 1985, when we concluded, that was still long before these chemicals were regulated.

TCE and PCE were not even regulated until 1989 and 1992, respectively. I can only surmise, sir, because I was not involved in the decisionmaking at that time, I can only surmise that we simply did not understand the ramifications of that contamination.

Senator BURR. But would you agree with me pertinent words here are "organic solvent?" I mean, there is a little room for poisonous chemical waste or other unsuitable compounds; either organic solvents or compounds, the definition of organic solvent has not changed. Would you agree with me on that?

General PAYNE. Sir, I am not a scientist. I am a war fighter, so I really cannot answer that.

Senator BURR. OK.

General PAYNE. Whether it has changed, whether we knew what that meant at the time, and whether that definition has changed, I'm sorry, sir.

Senator BURR. Well, we both cannot reconstruct the personnel or the decisions that were made at the time and I think in an effort to try to provide a fresh start, my hope is that we can identify that we have done some things wrong in the past and that now it is time to make the commitment to get the information we need to know how to go forward.

Let me, if I could, turn over to Dr. Gillooly.

General PAYNE. And we concur with that, sir.

Senator BURR. Thank you, sir. Why was the—I take for granted, you are the Public Health Center?

Mr. GILLOOLY. Yes, sir, Navy-Marine Corps Public Health Center.

Senator BURR. Did that used to be called the Navy Environmental Health Center?

Mr. GILLOOLY. Yes, sir.

Senator BURR. So, you have changed your name?

Mr. GILLOOLY. Yes, sir.

Senator BURR. OK, I just wanted to make sure I asked the right person the right question. Why was NRC not asked to review a broader set of risks?

Mr. GILLOOLY. We had the NRC review our previous two screening health risk assessments in 1995 and 1997. They more or less agreed with our findings and conclusions for those.

Senator BURR. The 2000 draft that they reviewed, they found—they raised several questions. How did you incorporate into the final rule what they raised?

Mr. GILLOOLY. Sir, we took their recommendations seriously. We worked approximately 6 more months just working those issues, incorporating where we could their primary issues about reducing the uncertainty and better characterization of the health risks. We provided to them a 100-page report that listed point-by-point which of those items we could actually do that were practicable at that point in time and they were included in the final report.

Senator BURR. But several of the issues were structural problems with the way you conducted your analysis throughout the thing. I am not sure how you could go back and remediate that unless it was to guess.

Mr. GILLOOLY. Well, I think I should back up. Number 1 is, when we first asked the National Resource Council to look at the report, typically you have an opportunity to discuss with them what you intend to do onsite and we were not able to because the Department of Justice had litigation ongoing.

So, issues such as challenges and limitations of trying to do a risk assessment overseas from a source that was privately owned outside the fence were very real. For example, the gold standard would be to get on that stack, that incinerator stack and measure the pollution coming out of the stack. We did not do that.

Senator BURR. Adopting that rationale would tell me that you would lean heavier on a contractor versus a DOD arm to actually conduct more of the study.

Mr. GILLOOLY. Well, it is a team approach. We had both contractors and——

Senator BURR. OK. Why would the NRC not be asked to look at the final report before it was published?

Mr. GILLOOLY. All I can tell you is the Navy Bureau of Medicine and Surgery forwarded the final draft report to the Commander in Chief, U.S. Pacific Fleet, for release. What happened after that I cannot comment on. In fact, I was surprised today when Dr. Feigley indicated he had not seen that.

Senator BURR. Mr. Resta, in your testimony, first paragraph, excuse me, first paragraph of burn pits, you said it should be used to minimum extent possible based on the operational situation. When open burning operations are necessary, they should be located as far downwind of personnel as possible.

That would suggest that there is a human risk to those burn pits. Am I making the right assumption?

Mr. RESTA. Yes sir, you are. Breathing smoke is not healthy.

Senator BURR. Then share with me this. Earlier this year, in the Defense Authorization Bill, I offered an amendment to study the issue of burn pits. The Committee rejected my amendment and said, due to objections from the Department of Defense.

Share with me any rational reason why the Department of Defense would not want to know whether burn pits had more than just smoke inhalation problems for our troops.

Mr. RESTA. I certainly cannot speak for the Department of Defense given where I am located, the Department of Army. I can hypothesize that perhaps our objections were that we are already working with the National Academy of Sciences on that very issue.

I would have to really take that for the record to find out what exactly we forwarded up there.

Senator BURR. Take that back for the record.

Mr. RESTA. Yes, sir.

[The information requested during the hearing follows:]

RESPONSE TO REQUEST ARISING DURING THE HEARING BY HON. RICHARD BURR TO JOHN J. RESTA, PE, MS, SCIENTIFIC ADVISOR, U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The Department of Defense (DOD) concurred in principle with the amendment, but due to the short timeline and lack of specificity, the amendment was not implementable. It is not possible to accomplish all the environmental monitoring indicated, have all the samples analyzed, and perform the necessary risk assessments, nor determine all health effects from burn pits within 180 days. Further hindering compliance, the 15 military installations or facilities required to be included in the

report were not specified. These gaps caused the DOD to object to the proposed amendment.

Senator BURR. I think even though you are in a very specialized area, I would think that you would be consulted on a decision like that.

Mr. Chairman, I have a ton more questions. I would like unanimous consent to be able to provide written questions and to get answers because one, we have been here a long time and I know you have things to do. These witnesses have been here for a long time. But I do want to make one observation.

Chairman AKAKA. Yes, Senator Burr. I have some questions too. We will certainly——

Senator BURR. OK, may I make one observation?

Chairman AKAKA [continuing]. Send them for the record.

Senator BURR. This Committee has struggled to try to make seamless the handoff of active duty troops to our Veterans Administration from the standpoint of the health care needs of our veterans.

Today I have come to the conclusion that our problem is far worse than just working with DOD on the electronic medical records making this is a seamless process where when you go into a new health care system they know exactly what you have been exposed to, they know exactly where you have been, they can assess what your health needs are based upon where you have served and what you might have been exposed to.

Today I found that it is much worse because even where we identify things that potentially could cause long-term health conditions to our active duty Reserve and called-up Guard, there is not an attempt to download that information to where we know these individuals will be, at some point, receiving their health care.

I sort of paint everybody on one side and I also paint everybody on the VA side for not screaming about the need to get this information. We have made tremendous progress between VA and DOD to try to get electronic medical records that are seamless.

If, in fact, exposure to burn pits has some potential downstream effects, then I want to make sure a VA doctor knows exactly where that person was so that they can see them and treat them based upon what their exposure might be. If they were at Camp Lejeune for those years, that information is absolutely essential to the VA side to take care of them.

If they were exposed to an incinerator—and it really does not matter what the conclusion of the report was, that is pertinent information to a medical doctor who is making a decision about an individual based upon what he sees and what he reads. And if he only has what he sees, the care cannot be as complete as if he matches that with what he reads.

So, I would hope on both sides of this table that the VA would become proactive in asking for the information that is pertinent to delivering care to these warriors on the active duty side, that we understand this is not about minimizing the potential effects of what we are in charge of. It is about making sure that we get the most pertinent information to all the people that can affect the best long-term quality-of-life for the individuals that may or may not have been affected.

Again, I thank all of you for your testimony. Thank you, Mr. Chairman.

Chairman AKAKA. Thank you very much, Senator Burr. This has been a great hearing. In closing, I again want to thank all of our witnesses for appearing today and for your responses as well.

To the veterans and family members of veterans affected by the exposures discussed today, I truly appreciate your willingness to share your stories with the Committee. I understand that these deeply personal matters are sensitive and are not always easy to speak so freely about.

As Chairman, I am committed to ensuring that VA continues to study the health effects related to these exposures and that VA adapts to meet the treatment needs of individuals affected by toxin exposures.

As I mentioned in my opening statement, in order for VA to do this DOD must first determine who was exposed and what they were exposed to and the health consequences of such exposure. The information must then be shared with VA. This Committee is not charged with direct oversight of DOD. That falls to the Armed Services Committee. However, this Committee shares the responsibility for oversight where the roles of DOD and VA intersect and we share several members, including me and Senator Burr.

To quote President Obama, "We cannot let burn pits and other exposures be this generation's Agent Orange." We have a responsibility to ensure that the newest era of veterans receive the highest quality of care and prevent the tragic stories we have heard today from happening again.

I thank you again for sharing your comments and thoughts and without question, it is going to be helpful to what we are trying to do to help the veterans of our country.

This hearing is now adjourned.

[Applause.]

[Whereupon, at 1:37 p.m., the Committee was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF PAUL C. AKERS, BS, MS, MD,
CAMP LEJEUNE, NC (1954–60)

My name is Paul C. Akers, M.D., and as you know from my preliminary information, I am a Marine Corps dependent, the son of MSgt. Paul A. Akers (deceased). I was born on August 3, 1945, at Miramar (Marine Corps Air Station). My family was stationed at Quantico, VA; El Toro, CA; Cherry Point, NC; and at Santa Ana, CA, prior to being stationed at Camp Lejeune, NC.

While we were stationed at Camp Lejeune, we lived in Tarawa Terrace II at 2505 Bougainville Drive (1954–59) and at 3040 Saipan Drive (1959–60). My sister and I attended base schools on Brewster Avenue, all schools being on one campus and encompassing grades one through twelve. My father was head of the meat department at the commissary and he was also assigned to Camp Geiger, ITR and other locations during our stay at Camp Lejeune. My mother was a housewife, and volunteered as a Grey Lady in the library of the Camp Lejeune Naval Hospital. The neighborhood students rode to school and to extracurricular destinations on USMC buses driven by enlisted Marine personnel. We played little-league baseball at a field adjacent to Tarawa Terrace I and little-league football on a field at Camp Geiger. Camp Lejeune High School teams practiced at the school but held their games in the outfield of the base baseball field or at the base football field, and they played basketball games at the base field house. Baseball games were played at the high school. Children played in the woods around Tarawa Terrace; the neighborhood boys played pick-up games on a make-shift diamond beneath a water tower in the complex.

Families drank, bathed in, cooked with, and ate food prepared with this water. In addition, families watered the flowers and lawns, washed their clothes, and children played in wading pools filled with this water. There were swimming pools on base, but I do not know the source of the water used to fill them. They were closed periodically during the summers due to polio outbreaks. Not only was Hospital Point the location for the base hospital, but it was also the site for social events, such as oyster roasts, birthday parties, etc. In the early 1950's, my family was stationed at Cherry Point MCAS, and I was sent to Camp Lejeune Naval Hospital to have my tonsils taken out. My mother was diagnosed with metastatic breast cancer in the mid-1950's; she had found a lump in her breast about a week or two before her diagnosis. Adm. Joseph L. Yon, M.D. was her surgeon. She had positive lymph node biopsies and underwent a radical mastectomy and subsequent radiation therapy. I was in the third or fourth grade at the time of her diagnosis. My mother died May 27, 1960 in the Naval Hospital in Quantico, Virginia. She and my father are both buried in Arlington National Cemetery. At the time of my mother's death, I was fourteen, and my sister was twelve.

My sister died with metastatic malignant melanoma on June 2, 2009, after having been diagnosed in early May, 2009. She was sixty-two years old at the time and had previously had some Gyn atypia as well. I was diagnosed with stage 4, non-Hodgkins lymphoma on April 29, 2009, and am currently undergoing treatment. Except for my mother, my sister, and myself, there is no history of malignancy on either side of our family.

As a physician and as a scientist, I am concerned on both a personal and professional level. Three of the major contaminants in the Camp Lejeune Water Study are classified as carcinogens and capable of causing the cancers that have been reported in my family. As a practicing physician, I would be highly concerned for my patients and would monitor their health statuses closely immediately after becoming aware of their exposure to the above-mentioned carcinogens. Believing the exposure was related to their duty stations—Camp Lejeune, El Toro, and other sites—I feel that the U.S. Government should assume the responsibility for monitoring these people's

health statuses and their associated medical. Since the exposure occurred during their service to the military (Marines, Navy, civilian base employees and dependants), the logical location for such monitoring and any subsequent related health care would be at a local VA hospital with all related expenses covered by the Veterans Administration. Validation of exposure potential may be obtained by review of the service or employee records.

I regret that I will be unable to deliver this testimony in person; however, as I mentioned earlier, I am still undergoing treatment and have an intrathecal methotrefate treatment scheduled for October 7, 2009. If I may provide any additional information, either in person or in writing, please do not hesitate to contact me.

PREPARED STATEMENT OF THE AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR)

CONTAMINATED DRINKING WATER AND HEALTH EFFECTS AT MARINE BASE CAMP LEJEUNE: FINAL PLANS OF THE AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

AUGUST 2009

EXECUTIVE SUMMARY

ATSDR has been assessing the human health risks from hazardous substances at U.S. Marine Corps Base Camp Lejeune since the late 1980s. The agency conducted public health assessments, initiated a variety of epidemiological studies, and employed state-of-the-art computational tools (modeling) to reconstruct exposures to volatile organic compounds (VOCs) from drinking water systems. In 1997, ATSDR characterized the VOC drinking water pollutants as a "past public health hazard," a position ATSDR continues to maintain. Since then, ATSDR has focused on epidemiological studies designed to measure the occurrence of illness and death among the service men and women and their families exposed to the contaminated drinking water.

Several documents or reviews of ATSDR's work have been completed during the past 14 months. ATSDR finalized *An Assessment of the Feasibility of Conducting Future Epidemiologic Studies at USMC Base Camp Lejeune* in June, 2008. ATSDR later held an April, 2009 Expert Panel to assess ATSDR's plans for historical reconstruction of drinking water contamination at Hadnot Point and Holcomb Boulevard. In June, 2009 the National Research Council (NRC) issued a report, *Contaminated Water Supplies at Camp Lejeune—Assessing Potential Health Effects.* This document considers this information and defines ATSDR's plans for completing our research activities at Camp Lejeune.

Tarawa Terrace exposure modeling: ATSDR will use its modeling to generate semi-quantitative exposure estimates for the planned epidemiologic studies rather than limit the use of the historic reconstruction to exposed/unexposed. ATSDR believes that the models provide a reliable means for assigning individuals to multiple exposure categories useful in epidemiologic studies. ATSDR's approach is supported by two previous expert panels that focused on exposure reconstruction efforts.

Hadnot Point exposure modeling: ATSDR will apply simpler modeling techniques for Hadnot Point and Holcomb Boulevard then those used for Tarawa Terrace. The Hadnot Point area is significantly larger than the Tarawa Terrace area and contains multiple contaminant source locations. Applying the complex numerical models used at Tarawa Terrace to the entire Hadnot Point area would be time consuming, costly, and add another level of uncertainty to the water modeling analysis. This approach is supported by both the NRC report and the ATSDR 2009 expert panel.

Reanalysis of birth outcomes study: ATSDR will proceed with its planned reanalysis of the birth outcomes study to correct for errors in exposure classification. To avoid further exposure misclassification, ATSDR will await the completion of the historic exposure reconstruction of the Hadnot Point drinking water system.

Birth defects and childhood cancer studies: ATSDR will complete its case-control study of birth defects and childhood cancers. The analysis will proceed expeditiously once the historic exposure reconstruction of the Hadnot Point drinking water system is completed.

Further epidemiological studies: ATSDR has proposed mortality and morbidity studies. The morbidity study will be based upon a "health survey" that would solicit information about diagnosed illnesses (e.g., cancer) from former service men and women and their families. ATSDR plans to move forward as quickly as possible to conduct the mortality study which has adequate study power and can be completed in a relatively short time period. ATSDR recognizes that a scientifically valid morbidity study based upon a health survey is time consuming and costly. The utility of the health survey depends upon high participation rates and the ability to secure objective confirmation of reported medical conditions. ATSDR will alter its plans for the health survey by using a phased approach, evaluating participation rates and diagnosis verifiability in advance of a complete survey of all eligible participants. ATSDR will define scientifically sound criteria for evaluating the results of the first phase, and for deciding upon the feasibility of a complete survey.

ATSDR concludes that the portfolio of epidemiologic studies is not only scientifically useful, but also a service to the community of service men and women and their families exposed to contaminated drinking water at USMC Base Camp Lejeune.

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I. HISTORY AND PURPOSE

ATSDR has been assessing the human health risks from hazardous substances at U.S. Marine Corps Base Camp Lejeune since the late 1980's. The agency conducted public health assessments, initiated a variety of epidemiological studies, and employed state-of-the-art computational tools (modeling) to reconstruct exposures to volatile organic compounds (VOCs) from drinking water systems. In 1997, ATSDR characterized the VOC drinking water pollutants as a past public health hazard, a position ATSDR continues to maintain. Since then, ATSDR has focused on epidemiological studies designed to measure the occurrence of illness and death among the service men and women exposed to the contaminated drinking water. ATSDR has enlisted four different Expert Panels and a Community Assistance Panel to help guide the development of this work.

Several documents or reviews of ATSDR's work have been completed during the past 14 months. ATSDR finalized *An Assessment of the Feasibility of Conducting Future Epidemiologic Studies at USMC Base Camp Lejeune* in June, 2008. ATSDR later held an April, 2009 Expert Panel to assess ATSDR's plans for historical reconstruction of drinking water contamination at Hadnot Point and Holcomb Boulevard. In June, 2009 the National Research Council (NRC) issued a report, *Contaminated Water Supplies at Camp Lejeune—Assessing Potential Health Effects*. ATSDR has carefully evaluated these reports, comments from the Camp Lejeune Community Assistance Panel, and comments from additional scientists and an environmental nongovernmental organization. ATSDR's plans take into consideration the underlying science, our commitment to serving communities exposed to hazardous substances, and address the comments and concerns of the reviewers.

II. SCIENCE AND SERVICE

ATSDR has a unique mandate to conduct human health research related to community exposures to hazardous substances. Although our knowledge of the relationships between chemical exposures and human health is often based upon studies of highly exposed workers or animal toxicology testing, there remains a pressing need to know whether lower level exposures, away from the workplace, cause human illness. ATSDR identified the drinking water contamination at Marine Base Camp Lejeune as an opportunity for conducting this type of research.

ATSDR recognizes the importance of setting appropriate expectations for our research. Our research studies must be of high quality. ATSDR research should contribute to the understanding of the human health effects of hazardous exposures such as VOCs in drinking water. While no single study can be conclusive, our re-

search should add information to the overall weight-of-evidence regarding associations between hazardous exposures and human health outcomes.

Our science serves a secondary, service-related, function: the right to know. At Camp Lejeune, hundreds of thousand of men and women lived and worked providing service to their country. Many were unknowingly exposed to VOCs in their drinking water. Beyond contributing to our general knowledge about these hazardous substances, ATSDR research studies will provide information that former service men and women of Camp Lejeune want to know about the health risks from these past exposures.

ATSDR believes conditions are appropriate to continue research at Camp Lejeune. ATSDR's research should help inform policy decisions that respond to the health concerns of the service men and women exposed to contaminated drinking water. However, the development of these policies need not await the results of ATSDR research. The policy decisions should be based a weight-of evidence assessment of all relevant human and animal studies and consider authoritative assessments that have previously been published. Policies should be flexible enough to incorporate new information, such as the results from the ATSDR studies.

III. PARTNERSHIPS AND OVERSIGHT

ATSDR serves the men and women who lived at Camp Lejeune while the drinking water was contaminated. Our work at Camp Lejeune would not be possible without the support and partnership of multiple people and organizations. Although no single person or group represents this diversity of people, many former marines have become active partners by serving on our Community Assistance Panel (CAP). The Department of Navy and United States Marine Corps have dedicated significant resources and efforts to assist ATSDR. Both groups have been instrumental in helping us understand the complexity and history of Camp Lejeune's drinking water systems. The quality of our efforts would have suffered without the dedicated interest and help from these people.

ATSDR recognizes the value of objective scientific review. Over the years ATSDR has assembled four separate expert panels as we developed our epidemiological studies and computer-based models of drinking water contamination. Two panels have addressed the historic reconstruction of contaminated drinking water at Camp Lejeune: first the Tarawa Terrace system and second the Hadnot Point and Holcomb Boulevard systems. A third expert panel focused on whether or not ATSDR should conduct epidemiologic studies of the Camp Lejeune population beyond studies of birth outcomes, birth defects, and childhood cancers. The fourth expert panel provided advice to ATSDR on scientific approaches to a congressionally mandated health survey. The NRC report provides an additional opportunity for objective external review. In addition, protocols and reports of ATSDR's work have routinely been peer-reviewed by experts outside the Agency.

IV. ATSDR CAMP LEJEUNE PORTFOLIO

ATSDR's work at Camp Lejeune is briefly described below for background purposes.

• *1990: Public Health Assessment for ABC One-Hour Cleaners, Jacksonville, Onslow County, North Carolina.* The first assessment related to Camp Lejeune focused on the contamination of ground water by tetrachloroethylene released from the ABC One-Hour Cleaners. This assessment found that PCE, detected in onsite and offsite wells, was the primary contaminant of concern.

• *1997: Public Health Assessment for U.S. Marine Corps Base at Camp Lejeune, Military Reservation, Camp Lejeune, Onslow County, North Carolina.* This assessment formed the basis for future public health research, including the ongoing water modeling, exposure reconstruction, and epidemiological studies. Although the drinking water section of the report needs to be updated, the report contains valuable and accurate historical information about nine other exposure pathways. ATSDR concluded in this report that exposures from VOCs in the drinking water at Camp Lejeune were a past public health hazard. ATSDR plans to reassess the drinking water pathway once the historic reconstruction efforts are completed.

• *1998: Volatile Organic Compounds in Drinking Water and Adverse Pregnancy Outcomes, United States Marine Corps Base, Camp Lejeune.* In 1995, ATSDR began a study of a variety of adverse pregnancy outcomes at Camp Lejeune in relation to drinking water VOC exposure. The study analyzed live births to women residing in base family housing when they delivered during the period January 1, 1968, through December 31, 1985. Birth certificates were studied from 6,117 tetrachloroethylene (PCE)-exposed women, 141 short-term trichloroethylene (TCE)-exposed women, 31 long-term TCE-exposed women, and 5,681 unexposed women. Associa-

tions between PCE and the study outcomes were observed in two potentially susceptible subgroups: infants of mothers 35 years of age or older and infants whose mothers had histories of fetal deaths. ATSDR also reported a reduction of birth weight for gestational age in male babies within the long-term TCE-exposed group. ATSDR later identified an error in the exposure classifications used in this study. ATSDR is planning to reanalyze this study with updated exposure information.

• *2005: Expert Peer Review Panel Evaluating ATSDR's Water-Modeling Activities in Support of the Current Study of Childhood Birth Defects and Cancer at U.S. Marine Corps Base Camp Lejeune, North Carolina. Analyses of Groundwater Resources and Present-Day (2004) Water-Distribution Systems.* ATSDR requested a panel of nine experts to provide input on the Agency's groundwater resources and water-distribution system modeling activities conducted from March–December 2004 at U.S. Marine Corps Base, Camp Lejeune, North Carolina. Overall, the experts indicated that this was an important study to conduct and were impressed with the quality of work performed to date. The panelists noted specific principal issues that needed to be addressed, and made recommendations for ATSDR's next steps. ATSDR has since followed the advice of the panel members.

• *2005: Report of the Camp Lejeune Scientific Advisory Panel.* In February 2005, ATSDR asked a panel of experts for advice regarding additional epidemiological studies related to people's exposure to contaminated drinking water at Camp Lejeune. The panel discussed a large range of possible adverse health impacts that could be related to short- and long-term exposure to TCE and other VOCs in the drinking water of Camp Lejeune. Several of these would be extremely challenging to study, and may not be feasible subjects for investigation, such as studies of effects that could involve medical evaluation of hundreds of individuals now living in widely scattered locations. There was agreement, however, that a study of mortality outcomes would be feasible (assuming the availability of adequate personal identifiers) and that a cancer incidence study might be feasible. Before embarking on full-scale studies however, the members recommend that ATSDR conduct one or more feasibility or pilot studies.

• *2007: Analyses of Groundwater Flow, Contaminant Fate and Transport, and Distribution of Drinking Water at Tarawa Terrace and Vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina: Historical Reconstruction and Present-Day Conditions.* Two of three water-distribution systems that have historically supplied drinking water to family housing at U.S. Marine Corps Base Camp Lejeune, North Carolina, were contaminated with VOCs. Tarawa Terrace was contaminated mostly with tetrachloroethylene (PCE), and Hadnot Point was contaminated mostly with trichloroethylene (TCE). Because limited measurements of contaminant and exposure data are available to support the epidemiological study, ATSDR used modeling techniques to reconstruct historical conditions of groundwater flow, contaminant fate and transport, and the distribution of drinking water contaminated with VOCs delivered to family housing areas. Based on probabilistic analyses, the most likely dates that finished water first exceeded the current maximum contaminant level (MCL) for PCE ranged from October 1957 to August 1958 (95 percent probability), with an average first exceedance date of November 1957. Exposure to drinking water contaminated with PCE and PCE degradation by-products stopped after February 1987 when the Tarawa Terrace water treatment plant was closed.

• *Ongoing: Exposure to VOCs in Drinking Water and Specific Birth Defects and Childhood Cancers, United States Marine Corps Base Camp Lejeune, North Carolina.* ATSDR has undertaken a study to determine if children born during 1968–1985 to mothers who were exposed to VOC-contaminated drinking water at Camp Lejeune at any time during the pregnancy were more likely to have specific birth defects or childhood cancers. The birth defects include spina bifida, anencephaly, and cleft lip and/or palate. The childhood cancers include leukemia and non-Hodgkin's lymphoma. The study design for the case-control study was completed in 2004 and underwent peer-review. Case-control interviews and the medical records confirmation phase of the study are complete. The study is awaiting completion of the water modeling.

• *2008: An Assessment of the Feasibility of Conducting Future Epidemiological Studies at USMC Base Camp Lejeune.* ATSDR released a feasibility assessment of conducting future epidemiological studies at the base. ATSDR visited the Naval Health Research Center (NHRC), the Defense Manpower Data Center (DMDC), and the DOD Education Activity storage facility at Fort Benning, Georgia, to determine whether available databases could identify adults and children who lived at the base, or civilians who worked at the base, during the period when drinking water was contaminated with VOCs. ATSDR also convened a panel of epidemiologists with experience in military and occupational cohort studies to provide recommendations on future studies (Appendix A of the report). ATSDR concluded that a mortality

study and a cancer incidence study are feasible. Available DOD personnel databases can identify active duty Marines and naval personnel and civilian employees stationed at the base during the period when the Hadnot Point and Tarawa Terrace drinking-water systems were contaminated with VOCs. ATSDR also concluded that it may be feasible to include in the cancer incidence study those who participated in the ATSDR 1999–2002 survey and those who will participate in the congressionally mandated Navy/Marine Corps health survey scheduled for 2009. These studies should have sufficient statistical power to detect moderate excesses (e.g., standardized mortality ratios [SMRs] <2.0) in specific cancers among those exposed to the contaminated drinking water (see Appendix B). ATSDR completed internal clearance of the feasibility assessment and released it to the public.

• *2009: Expert Panel Assessing ATSDR's Methods and Analyses for Historical Reconstruction of Groundwater Resources and Distribution of Drinking Water at Hadnot Point, Holcomb Boulevard and Vicinity, U.S. Marine Corps Base, Camp Lejeune, North Carolina.* ATSDR convened a panel of 13 groundwater modeling, water-distribution system analysis, and epidemiological experts to help the agency evaluate the information, data, and modeling methods to be applied to Hadnot Point, Holcomb Boulevard, and vicinity at Camp Lejeune. The panel provided specific recommendations. Individual experts stated that the project was worthwhile and agreed that it would be possible for ATSDR to reconstruct potential historical exposures for the proposed epidemiological studies.

V. THE JUNE 2009 NRC RECOMMENDATIONS

The National Research Council released its report, *Contaminated Water Supplies at Camp Lejeune—Assessing Potential Health Effects*, in June 2009. The summary recommendations directed at ATSDR, and a summary of our science-based position regarding these recommendations, are described below.

NRC Recommendation 1: For the purpose of epidemiologic studies, the results of the Tarawa Terrace historical reconstruction can be used to characterize people as being exposed or unexposed on the basis of date and location of residence or workplace. The monthly estimates imply more accuracy than is appropriate and should not be used to characterize exposure of individual people.

ATSDR will use its modeling to generate semi-quantitative exposure estimates for the planned epidemiologic studies rather than limit the use of the historic reconstruction to exposed/unexposed. ATSDR believes that the models provide a reliable means for assigning individuals to multiple exposure categories useful in epidemiologic studies. ATSDR's approach is supported by two previous expert panels that focused on our exposure reconstruction efforts.

The usefulness of the Tarawa Terrace model-estimated monthly average PCE concentrations has been clearly demonstrated by its concordance with measured PCE concentrations in water samples taken from the Tarawa Terrace water treatment plant prior to distribution to its customers (i.e. finished water samples). A "goodness of fit" comparison between the model calibrations and measurements of finished Tarawa Terrace water lead ATSDR, as well as our drinking water panel of experts, to conclude that the modeled monthly estimates can be used to create reasonably accurate exposure categories for the epidemiological studies.

The use of an exposed/unexposed classification for past drinking water contamination would result in a significant loss of important scientific information. ATSDR reviewed the distribution of modeled monthly drinking water exposures at Tarawa Terrace and documented that significant variability of exposure exists across the study population. Children in the birth defect and childhood cancer study who received drinking water from Tarawa Terrace during the first month of gestation were exposed to estimated average monthly drinking water contamination levels that range from 3 ppb to 182 ppb. A similar distribution is seen for mothers who lived at Tarawa Terrace and were included in the birth outcome study.

The use of an exposed/unexposed classification system would inaccurately assess risk and potentially miss an observed effect if one truly exists. It is important to utilize all relevant information in the exposure assessment so that exposure categories can be created that are as homogeneous as possible with respect to risk. The NRC report (p. 29) acknowledged this point when it emphasized the importance of correctly classifying the magnitude of exposure, differentiating "between those who are exposed at magnitudes that could result in adverse health effects (sensitivity) and those who are exposed at lower magnitudes (specificity)." Moreover, an important research question is whether the risk for a disease increases with increasing exposure. This question cannot be addressed using an exposed vs. unexposed classification.

Recommendation 2: Because any groundwater modeling of the Hadnot Point system will be fraught with considerable difficulties and uncertainties, simpler modeling approaches should be used to assess exposure from the Hadnot Point water system. Simpler modeling will not reduce the uncertainty associated with the estimates, but they have the advantage of providing a broad picture of the timeframe and magnitude of exposure encountered by people who used water from that system more quickly and with less resources than complex modeling exercises.

ATSDR will apply simpler modeling techniques for Hadnot Point and Holcomb Boulevard then those used for Tarawa Terrace. The Hadnot Point area is significantly larger than the Tarawa Terrace area and contains multiple contaminant source locations. Applying the complex numerical models used at Tarawa Terrace to the entire Hadnot Point and Holcomb Boulevard areas would be time consuming, costly, and add another level of uncertainty to the water-modeling analyses. This approach is supported by both the NRC report and the ATSDR 2009 expert panel. The information from the models will be used in all of ATSDR's epidemiological studies to classify individuals into categories of exposure and provide a service to the affected community.

The models needed to reliably estimate water concentrations for Hadnot Point and Holcomb Boulevard will be developed specifically to address issues for these areas. If available, better field characterization and details will be added to conceptual models to improve understanding of both hydraulics and transport at selected sites where potential exposure was high. ATSDR will use locally-refined grids to model selected sites of interest. ATSDR will select and develop simulation tools based on site-specific conditions, characteristics, and requirements.

Recommendation 3: The Committee recommends that ATSDR go forward with reanalyzing its study of birth outcomes to correct for errors in exposure classification without awaiting the results of groundwater modeling of the Hadnot Point system. . . . Reanalyses should include development of a detailed written analysis plan.

Despite the Committee's concerns about the statistical power of the study of birth defects and childhood cancer, it recommends that the study be completed as soon as possible.

ATSDR will proceed with its planned reanalysis of the birth outcomes study to correct for errors in exposure classification. To avoid further exposure misclassification, ATSDR will await the completion of the historic exposure reconstruction of the Hadnot Point drinking water system. ATSDR will complete its case-control study of birth defects and childhood cancers. The analysis will proceed expeditiously once the historic exposure reconstruction of the Hadnot Point drinking water system is completed. ATSDR has developed a detailed analysis plan for these studies.

ATSDR believes that due to significant variability of exposures among people at Hadnot point and Holcomb Boulevard, it is essential to complete the simpler water modeling for Hadnot Point. Monthly average contaminant levels will likely vary depending on when contaminated wells were operating. In addition, exposure will vary because of the transfer of water from Hadnot Point to Holcomb Boulevard during the dry spring-summer months.

The birth outcome study cannot be reanalyzed without awaiting the Hadnot point water-modeling results. The previous analysis considered the drinking water supplied in Holcomb Boulevard uncontaminated, even though the area had originally been supplied contaminated water from Hadnot Point. The Hadnot Point water models must be completed to accurately classify exposures in Holcomb Boulevard during those years. Once, an acceptable historic dose-reconstruction of exposures at Holcomb Boulevard and Hadnot Point become available the epidemiological data will be analyzed.

Recommendation 4: The Committee found that although ATSDR did consider the major issues bearing on the feasibility of the proposed studies and proposed reasonable approaches to conducting the studies, there remain serious, unresolved questions about the feasibility and ultimate value of the studies. . . . the Committee concluded that most questions about whether exposures at Camp Lejeune resulted in adverse health effects cannot be answered definitively with further scientific study. New studies should be undertaken only if their feasibility and promise of providing substantially improved knowledge on whether health effects have resulted from water exposure at Camp Lejeune are established in advance.

ATSDR has proposed mortality and morbidity studies. The morbidity study will be based upon a "health survey" that would solicit information about diagnosed illnesses (e.g., cancer) from former service men and women and their families. ATSDR plans to move forward as quickly as possible to conduct the mortality study which has adequate study power and can be completed in a relatively short time period. ATSDR recognizes that a scientifically valid morbidity study based upon a health survey is time consuming and costly. The utility of this survey depends upon high

participation rates and the ability to secure objective confirmation of reported medical conditions. ATSDR will alter its plans for the health survey by using a phased approach, evaluating participation rates and diagnosis verifiability in advance of a complete survey of all eligible participants. ATSDR will define scientifically sound criteria for evaluating the results of the first phase, and for deciding upon the feasibility of a full study. To determine whether a full research study can be conducted, ATSDR will conduct a pilot study, contacting a 10% sample (35,000 to 40,000) of those targeted for the health survey and evaluate the ability to locate participants, achieve an adequate participation rate, and confirm self-reported diseases. ATSDR will mail a health survey to the remaining 90% of the study group to assure compliance with congressional authorizing language. If the pilot study demonstrates adequate response rates and medical confirmation, the same methods will be extended to the entire population. ATSDR will develop algorithms to determine the needed participation rate and diagnosis verification rate to assure valid results, and will evaluate the pilot study accordingly. If participation rates and medical confirmation are inadequate for a scientifically valid health survey, ATSDR will analyze and report the survey results without costly efforts to improve participation and assure medical confirmation.

ATSDR has confirmed that adequate personnel data to establish a study cohort are available from the Defense Manpower Data Center's databases. These are the primary sources of data on former active duty and civilian employees for the mortality study and the health survey. These data contain names, social security numbers and dates of birth as well as other information such as rank, job duties, and length of employment or active duty service, and a unit code that places active duty men and women within Camps Pendleton and Lejeune. These data are sufficient for conducting a National Death Index search for the mortality study and initiating the search to contact people for the health survey.

ATSDR has assessed the statistical power of the proposed mortality and morbidity studies. Statistical power is the probability of finding an exposure-disease association if an association does exist. The study power calculations were included in the study protocols which were not reviewed by the NRC committee. The study power estimates for the cancer mortality endpoints are adequate. The study power estimates for the health survey are also considered adequate, the health survey calculations are based upon a 65% participation rate which may be optimistic. The statistical power calculation on comparisons between Camp Lejeune and the general population showed that an SMR of 1.6 could be detected for kidney cancer with 90% power and a type 1 error (α error) of .10. For the comparison with Camp Pendleton, and assuming a similar cancer rate at Pendleton as for the general population, an SMR of 2.0 can be detected with 90% power and incorporating a 10 year latency. Lower SMRs can be detected with 90% power for other cancers of interest such as non-Hodgkin's lymphoma, leukemia, lung, colon/rectal, liver, and brain cancer. [Note: Because the U.S. rate for each cancer is based on very large numbers, the variability in the rate is ignored in power/sample size calculations. However, the variability in the rate for each cancer at Camp Pendleton must be taken into account in the power/sample size calculations. The result is that the SMR or SIR that can be detected with a specified sample size, latency, type 1 error, and type 2 error will be higher for the comparison between Camp Lejeune and Camp Pendleton than it will be for a comparison between Camp Lejeune and the U.S. population.] Statistical power was evaluated for the morbidity study protocol that was approved by the CDC IRB and peer-reviewed. Comparing Camp Lejeune with Camp Pendleton, assuming a 65% participation rate, incorporating a 10 year latency period, and using a type 1 error of .10 and a type 2 error of .10 (i.e., 90% power), an RR of <1.6 can be detected for kidney cancer incidence. Lower RRs can be detected for non Hodgkin's lymphoma, lung, and colon/rectal cancer.

Selection bias in the health survey is possible even with a 65% or higher participation rate. The degree to which bias might influence the study results is related to disease prevalence. Rare diseases are more easily influenced by low participation than common diseases. Although a high participation rate decreases the likelihood of bias, a low participation rate does not guarantee that bias will occur. On the other hand, low participation rates do diminish study power and decrease the overall confidence in study results.

The health survey will utilize several approaches to achieve adequate participation rates to reduce the likelihood of selection bias. To enhance participation rates in the Camp Lejeune and Camp Pendleton populations, ATSDR proposes to have the Commandant of the USMC sign the letter that accompanies the survey encouraging participation. The Commandant's endorsement will ensure that active duty and retired Marines and their families perceive the study as legitimate. The selection of Camp Pendleton as a comparison population should also help to reduce the

likelihood of selection bias. Both bases have had problems with toxic waste sites and are likely to have similar workplace exposures. To motivate populations at both bases to participate in the survey, all mailings will encourage those who experienced any environmental or workplace exposures to participate. The health survey will utilize a standard methodology that has been demonstrated to enhance participation rates in mailed surveys (the Dillman method). Participation will be made convenient by giving respondents the choice of completing a hard copy or web-based survey, and the survey instrument will be of optimum length to address the research questions of interest without overburdening the respondent.

ATSDR recognizes the importance of accurately ascertaining adverse health outcomes. For the mortality study, a standard approach will be used: vital status will be determined using an algorithm that utilizes several national databases and the National Death Index will be used to identify causes of death. For the morbidity study, only health outcomes confirmed by medical records or cancer registrations will be evaluated in the analyses. ATSDR plans to utilize all 50 state cancer registries, the VA cancer registry, and the DOD cancer registry to confirm self-reported cancers identified from the health survey. ATSDR will obtain confirm disease status by obtaining medical records for non-cancer outcomes of interest.

ATSDR has been meeting with state cancer registries that are funded by CDC's National Program of Cancer Registries (NPCR) and National Cancer Institute's Surveillance and Epidemiology End Results (NCI SEER). ATSDR also has had discussions with the VA and DOD cancer registries. All are supportive of working with ATSDR to confirm self-reported cancers from the health survey. In addition, a major consideration in the selection of a contractor for the health survey will be the demonstrated ability of the contractor to obtain medical records for disease confirmation.

VI. IMPLEMENTATION AND TIMELINE

ATSDR is moving ahead as planned with its portfolio of activities, dependent upon funding from the Department of Navy. ATSDR will provide an updated 2010 Annual Plan of Work based on this final plan. ATSDR hopes to proceed with the Mortality Study immediately if the research contract can be awarded in FY2009. The health survey cannot begin before FY2010 because of limitations with the planned funding mechanism and the decision to conduct a pilot study. A revised time-line will be developed for the morbidity study that is based upon the health survey. The pilot phase of the health survey is likely to begin sometime after March 2010.

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PREPARED STATEMENT OF THE CAMP LEJEUNE COMMUNITY ASSISTANCE PANEL (CAP)

July 23, 2009

CAP position on the NRC Report:

We, the members of the Camp Lejeune Community Assistance Panel recommend that ATSDR not accept the major conclusions of the National Research Council report titled "Contaminated Water Supplies at Camp Lejeune – Assessing Potential Health Effects," dated June, 2009. Our reasons for this recommendation are as follows:

1. The NRC Committee, in Chapter 2 of their report, misunderstood critical information about the nature of the groundwater and drinking water contamination and misrepresented the analytic work done to date by scientists at ATSDR and Georgia Institute of Technology. These points were made verbally by Prof. Mustafa Aral at our CAP meeting on July 8, 2009 and in more detail in his June 30 Memorandum to Morris Maslia. We were persuaded by Prof. Aral that the NRC assessment of the water modeling work done by ATSDR to date and projected in the next phase of the work on Hadnot Point was fundamentally flawed and should be rejected by the Agency. A copy of Prof. Aral's Memorandum is attached to this statement.

   The reports of the Tarawa Terrace modeling effort have been reviewed by geohydrology and water modeling experts from outside the agency. The reliability of the monthly average estimates can be seen by comparing the model estimates with the actual measurements taken at the Tarawa Terrace Treatment Plant, as the water entered the distribution system. The modeled results were within a factor of two of the actual measurements (see Table A10 of Chapter A: Summary of Findings). This close agreement between estimated monthly averages and measurements taken at specific points in time demonstrates that the modeled estimates are of sufficient quality for use in epidemiological studies at the base. The NRC report failed to mention these findings.

   The specific conclusion, on p. 22 of the NRC report, that it would only be possible to "assign exposure categories of exposed and unexposed" in the current and future health studies should also be rejected by the Agency. The Camp Lejeune Water-Modeling Expert Panel meeting held in April 2009 agreed that the monthly average estimates for the Tarawa Terrace system were reliable and should be used in the epidemiological studies to assign exposures. This Panel also recommended that the water modeling effort at Hadnot Point produce similar monthly average estimates in the distribution system. The members of this panel are nationally recognized experts in the fields of geohydrology and exposure assessment, and they have extensive and broad expertise in all aspects of groundwater fate and transport modeling and water distribution system modeling. In addition, the panel included nationally recognized experts in the field of environmental epidemiology.

   Crudely categorizing people as exposed or unexposed in the Camp Lejeune studies would introduce a bias that could eliminate any chance of finding a health

effect from the drinking water exposures at Tarawa Terrace or Hadnot Point. The magnitude of the errors that would be introduced by the crude categorization, "exposed vs unexposed", can be seen by examining the monthly average estimates obtained from the Tarawa Terrace models (Appendix A2 of Chapter A: Summary of Findings). For example, over the study period covered by the adverse birth outcome study and the case-control study of specific birth defects and childhood cancers (i.e., from early 1967 when the first pregnancies began through the end of 1985), monthly average PCE levels ranged from <1 ppb to 183 ppb. Simply categorizing people as "exposed" would mix together those with very high exposures and those with exposures well below the current standard of 5 ppb. Furthermore, as one member of the April water modeling panel pointed out, if an "exposed/not exposed" categorization were used in the Cape Cod studies of PCE exposure through drinking water pipes, no effect would have been seen.

2. The NRC Committee, in Chapter 4 of their report, takes what appears to be a very conservative review of the toxicological literature regarding the hazards of exposure to TCE and PCE. The hazard evaluation of these two chemicals, beginning on p. 129, uses LOAEL values from animal studies and compares them to water contaminant levels measured in Camp Lejeune water at various points. They conclude that for health endpoints such as kidney cancer, kidney toxicity, immunosuppression and neurotoxicity the levels of contamination are not likely to cause these health problems in those exposed at Camp Lejeune. The report admits that exposure to other volatile organic compounds may have occurred at Camp Lejeune and that this may have added to the risk; they note that this additivity "is not formally incorporated into this appraisal." (p. 129)

   The NRC report also noted "the evaluation has not taken into account uncertainties and additional considerations (see Chapter 3) related to potentially sensitive subpopulations (such as fetuses and the elderly), possible interindividual variability in response related to sex and genetic background. . . and VOC interactions." (p. 132) These limitations render the toxicological conclusions of limited value in guiding what future health studies ATSDR should carry out.

   It is also worth noting the long footnote at the bottom of p. 132. We understand that, although the listed members of the NRC committee signed off on the content of the final report, there was considerable disagreement expressed at various points during the last few months prior to June, 2009. We urge ATSDR to examine the reasons for the disagreement expressed in the footnote and to contact the initial member of the committee who resigned and did not sign the final report.

   The dissenting committee member correctly pointed out that the use of LOAELs for non-cancer outcomes without incorporating uncertainty factors is inappropriate. Depending on the outcome and the quality of the toxicological or

epidemiological study being used, uncertainty factors of up to 3,000 are applied to the LOAEL. Applying a 3,000 uncertainty factor to the LOAELs used in the NRC report, those exposed to 1,400 ppb TCE in the drinking water at Hadnot Point could be at risk for immunosuppression and for renal disease (especially in children), and children exposed to PCE in the Tarawa Terrace drinking water supply could be at risk of neurotoxic effects.

For kidney cancer, the NRC report uses a LOAEL of 1,000 mg/kg per day. We are aware of other analyses that take into account human variability and other considerations (see Rhomberg, 2000) that indicate that the daily dose from an exposure to 1,400 ppb TCE at Hadnot Point would be unacceptably high. Other analyses indicate that the risk of non-Hodgkin lymphoma would also be a health concern from this exposure.

But a more fundamental point was raised at our July 8 meeting by ATSDR staff: LOAELs should not be used for cancers because it assumes a threshold dose when an appropriate measure is the cancer slope factor. Using reasonable assumptions about exposure of three years for children and adults, the cancer risks for TCE range from 3 per 100,000 to 3 per 1,000, and the cancer risks for PCE range from 2 per million to 2 per 10,000. Given that the cancer risk ranges for exposures to either PCE or TCE include values that exceed a 1 per 10,000 risk, this is evidence that these exposures have the potential to cause excess cancers in the Lejeune population. The NRC report describes these risks as "low,"when the measured levels of these chemicals were 40 to almost 300 times the current standard for drinking water. ATSDR should ignore the NRC characterization of Camp Lejeune exposures as low and health effects as "unlikely to have occurred."

For PCE, the NRC report uses a LOAEL of 50 mg/kg/day for neurotoxicity based on a rat study. However, studies of residents living near or above dry cleaning facilities have found neurological deficits at inhalation exposures much lower than this LOAEL. In these human studies, a LOAEL of about 1.1 mg/kg/day was observed. After adjusting this LOAEL by 100 to account for human variation and the use of a LOAEL, the adult dose that would occur from exposure to 200 ppb PCE at Tarawa Terrace would be just high enough to indicate a possible health concern. For children, their exposure would be more than enough to warrant a health concern.

Other contaminants such as benzene and vinyl chloride were not considered in the hazard evaluation in the NRC report. Depending on the levels of vinyl chloride in the drinking water at Hadnot Point (due to degradation of TCE and PCE in the groundwater) the cancer risks may be as high or higher than those calculated above for TCE. This is due to the high cancer potency for vinyl chloride (1.5 mg/kg/day lifetime exposure from birth).

The NRC Committee, in Chapters 5 and 6 of their report, reviewed the epidemiologic literature on the health effects of TCE and PCE in both exposed

workers and exposed communities. In Appendix D, they also provide brief reviews of the epidemiologic evidence regarding vinyl chloride, 1,1-dichloroethylene, 1,2-dichloroethylene, methylene chloride, benzene and toluene. In doing this, they used a series of categories that were developed by National Academy of Sciences Institute of Medicine (IOM) committees reviewing literature regarding exposures to veterans of the Vietnam and Persian Gulf Wars. The NRC committee concluded that none of the Camp Lejeune exposures reached the top two, e.g., Sufficient evidence of a Causal Relationship or Sufficient Evidence of an Association. This contradicts a previous IOM report in 2003, which concluded that studies of populations exposed to mixed solvents (including TCE and PCE) provided Sufficient Evidence of an Association with leukemia. Apparently, the Camp Lejeune committee reviewed the same and more recent literature and felt that this previous conclusion was too strong. On the contrary, we believe that the Camp Lejeune committee's conclusion is too weak.

Based on consistent positive findings across well-conducted occupational or drinking water studies, we believe that the following diseases, categorized in the NRC report as having "limited/suggestive evidence of an association," esophageal cancer and PCE, kidney cancer and TCE, lung cancer and PCE, liver cancer and TCE, cervical cancer and PCE, non-Hodgkin's lymphoma and TCE, miscarriage and PCE, scleroderma and solvent mixtures, and neurobehavioral effects and solvent mixtures (and specifically, PCE) should be placed in the higher category of "sufficient evidence of an association"

The NRC report categorized TCE and childhood leukemia as having "inadequate/insufficient evidence to determine whether an association exists." We believe that, based on the findings of the Woburn childhood leukemia studies, the Tom's River, NJ findings, and the findings in a study of 75 towns in northern NJ, and a valid animal model, childhood leukemia and TCE should be categorized as having "sufficient evidence of an association."

A member of the CAP and four other scientists familiar with the Camp Lejeune exposure wrote a statement in which they expressed their disagreement with the review of the epidemiologic evidence in the NRC report. We urge ATSDR to consider the comments and reviews of the literature by these five scientists published in peer-reviewed scientific articles.

The NRC report stated: "on the basis of what is known about the contamination of water supplies at Camp Lejeune; the size, age, and residential mobility of the residents; and the availability of records, the committee concludes that it would be extremely difficult to conduct direct epidemiologic studies of sufficient quality and scope to make a substantial contribution to resolving the health concerns of former Camp Lejeune residents. We strongly disagree with this conclusion. A panel of epidemiologists, including one CAP member, convened by ATSDR in 2008 concluded that the mortality study and health survey study were feasible and could make an important contribution to the scientific literature on the health

effects of drinking water exposures at Camp Lejeune. The protocols for the mortality study and the health survey study have been reviewed by outside experts in occupational and environmental epidemiology. Both the mortality study and the health survey study will have more than sufficient statistical power (90%) to detect moderately elevated cancer risks among exposed Marines (e.g., for kidney cancer, ≥60% excess risk or a relative risk of ≥1.6). The CAP has discussed these studies at several meetings and we strongly endorse them.

For these reasons, we strongly urge ATSDR to reject the major conclusions and recommendations of the NRC report dated June, 2009. We support the plans to carry out the Camp Lejeune studies that ATSDR has already underway or planned, and which we have discussed at length in CAP meetings. We note that the NRC committee endorsed some of these, such as updating the birth outcomes study with new water information about who was exposed, and finishing the birth defects and childhood cancer studies. We urge ATSDR to complete these and other planned studies using the exposure information that will be provided by the water modeling work underway.

Finally, we would be remiss if we did not point out that ATSDR was created by Congress to protect the public from environmental contamination and conduct health studies in communities and populations where people were exposed. The ATSDR leadership has not yet taken a strong stand in support of the work done by their own staff regarding Camp Lejeune. The Investigations and Oversight Subcommittee of the House Science and Technology Committee addressed some of these leadership issues during testimony they received at a March 12, 2009 hearing; we have attached the Subcommittee's press release to this statement. It is imperative for ATSDR leadership to take a strong statement in opposition to the June NRC report and express public support for the on-going and planned health studies at Camp Lejeune.

Signed,

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In remembrance of Denita McCall

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Senator Richard Burr,
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Senator Chuck Grassley,
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PREPARED STATEMENT IN RESPONSE TO NATIONAL RESEARCH COUNCIL REPORT ON CAMP LEJEUNE

We are disappointed and dismayed at the report titled, "Contaminated Water Supplies at Camp Lejeune—Assessing Potential Health Effects," released by the National Research Council (NRC) on Saturday, June 13, 2009. This report was two years in preparation by scientists, many of whom we know and respect, that reached puzzling and in some cases erroneous conclusions. We are aware of the complex situation regarding availability and access to data, and each of us has participated in committees advising the Agency for Toxic Substances and Disease Registry (ATSDR) about how to move forward with health studies. It is our view that the Marines and their families who were exposed to dangerous chemicals in the Camp Lejeune drinking water over several decades deserve to know if this exposure has had an effect on their health. The most direct way to assess this is to conduct valid epidemiologic studies of those who lived or worked there, and we urge ATSDR to continue their efforts to carry these to conclusion. The overall judgment about the impact of the chemicals on health can then be informed both by the general scientific literature the NRC reviewed, plus findings from directly relevant studies of the exposed population.

Specific areas where we disagree with the NRC report include their assessment of the water distribution modeling, their assessment of the risk caused by exposure to two of the principal contaminants (TCE and PCE), and the likelihood of conducting meaningful epidemiologic studies in this setting. We view the water modeling undertaken by ATSDR and its consultants as "state-of-the-art" and worth carrying through to completion so that it can be used in the on-going and proposed health studies. There may be uncertainties about specific levels of exposure for individual households or people, but these can be described in the study results. We also agree with the National Toxicology Program that TCE and PCE are "reasonably anticipated to be human carcinogens" and reject the characterization of the evidence as "limited/suggestive" as presented in the NRC report. We note that this characterization of solvent mixtures actually steps back from previous work done by the National Academy of Sciences Institute of Medicine in 2003. Finally, we disagree with the thrust of the NRC report that it is unlikely that scientifically informative epidemiologic studies of the Camp Lejeune population can be done. The NRC doubts that "definitive" answers can come from any study, but this sets the bar too high—no one study can provide definitive answers, and all studies must be considered in the light of other scientific evidence. From our experience in other settings, we believe that useful studies of the Camp Lejeune population are possible and furthermore that the Marines and their families deserve our government's best efforts to carry them out.

For these reasons, we urge the ATSDR to consider this particular NRC report in the context of other expert advice they have received during the past decade and the competent work already done by agency staff. Since the NRC report is at such variance with the recommendations of other water modeling and epidemiologic experts, we believe it should not stand as the final word.

Sincerely,

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PREPARED STATEMENT OF DAVID A. BRISCOE, U.S. MARINE (RET.)

Good morning, my name is David Briscoe and I served my country faithfully for 8 years in the United States Marine Corps. I spent 7 of those 8 years at Camp Lejeune and for 3 of the 7 years I lived in base housing with my family. What I didn't know was the fact that the tap water that served both my place of duty and my home was highly contaminated with PCE, TCE, DCE, vinyl chloride, benzene, toluene, ethylbenzene, and xylene.

Five and one-half years following my honorable discharge from the USMC, I was diagnosed with adenocystic carcinoma of the right pallet. I had a surgical resection performed at the Baltimore VA hospital and multiple postoperative radiation treatments in Washington, DC. I would later require 25 hyperbaric oxygen treatments at various treatment facilities because of poor healing believed to have been caused by the radiation therapy.

Following my cancer surgery and treatments my family and I moved back to Onslow County, NC, which is my wife's original home. It was shortly after this relocation that I became aware of the contamination in the drinking water at Camp Lejeune. It was at this time that I began pursuing my VA benefits related to service connection because of my exposure to the high levels of contamination in the tap water on the base. The period of time which my exposure to these chemicals took place, the Department of the Navy and United States Marine Corps officials knew of their existence in our tap water (see attachment A, B, C, & D). In a September 1985 Raleigh News and Observer article (see attachment E) related to the contamination aboard Camp Lejeune, Robert Alexander, a base environmental engineer, was quoted as saying, "Of all the contamination sites aboard the base, no people had been directly exposed to any of the pollutants." Then on 25 February 1988, the Assistant Chief of Staff, Facilities Marine Corps Base, Camp Lejeune, NC, Colonel Thomas J. Dalzell was interviewed by the base newspaper the "Globe." (see attachment F) The title of this article was "HAZARDOUS WASTES AND THEIR EFFECTS EXPLAINED." During this interview, Col. Dalzell was asked many questions, but two of these questions along with the Colonel's responses really stood out. The dialog was as follows:

> *Question.* Is my health or the health of my family in any danger?
> Response. No, it's not. All the wells which we get our raw water out of are continually tested and the wells that were identified as being contaminated have been closed off. All the other wells with water coming out contain no health problems at all to any individual who is living or working aboard Camp Lejeune or anyone in the local community.
>
> *Question.* What about prior to 1983?
> Response. At that time, we were not aware of any of these particular compounds that might have been in the ground water and we have no information that anyone's health was in danger at that time.

Both of these authority figures were fully aware of the fact that no less than four laboratories had identified contaminants in Camp Lejeune's tap water as early as October 1980. On 10 August 1982, Grainger Analytical Laboratory in Raleigh, NC, wrote a letter to the Commanding General of Camp Lejeune warning him that what they had discovered in the base's drinking water was "more important from a health stand point" than what the water was initially being tested for. In their letter, Grainger laboratory went on to identify and quantify the contaminants they discovered. Both of these men knowingly lied to the tens of thousands of Marines, Sailors,

their family members and civilian employees whose health and safety these men were entrusted.

Once the Department of the Navy (DON) and United States Marine Corps (USMC) claims that "no people had been exposed to any pollutants" was proven wrong, they began a new campaign of dis/misinformation related to regulatory standards for these chemicals. They (DON/USMC) then began stating "we had violated no state or EPA standards regarding these specific chemicals in drinking water." While there is an ounce of truth in this claim, because there were no state or USEPA standards regulating the presence of these chemicals in public water supplies at that period of time, they (DON/USMC) had detailed, explicit regulations/standards for both drinking water and the chemicals which had contaminated Camp Lejeune's water supply dating as far back as 1963 (see attachments G, H, I). I have learned that when dealing with the DON/USMC in this situation that it isn't so much as "what they say" which counts, it is what they "don't say!"

Based upon what is known regarding the Camp Lejeune drinking water issue, there is absolutely no reason that it took me 8 years to acquire the VA benefits which I so rightfully deserved and am now receiving (See attachment J). It is quite obvious that the DON/USMC publicly misrepresented the human exposures and their own regulatory responsibilities at the base and there is absolutely no reason for any veteran who served at Camp Lejeune during the contamination period who is suffering health consequences to be denied his or her service-connected VA benefits. Absolutely NONE!

PREPARED STATEMENT OF CANDY LITTLE

MY LATE HUSBAND GEORGE AND I WERE STATIONED AT CAMP LEJEUNE FROM 1970–1972. THERE WE CONCEIVED A DAUGHTER, MICHELLE, MY PREGNANCY WAS NORMAL UNTIL SEPT. 14, 1972, WHEN OUR LIVES WERE CHANGED FOREVER. MICHELLE WAS STILLBORN, CAUSE OF DEATH, INTRA UTERINE ASPHYXIA PLACENTAL INSUFFICIENCY, AND NO ONE HAD ANY ANSWERS TO GIVE US.

WE HAD 2 SONS NOT CONCEIVED AT CAMP LEJEUNE AND THEY ARE BOTH HEALTHY.

TRAGEDY STRUCK AGAIN WHEN I WAS 5 MONTHS ALONG WITH OUR YOUNGEST SON, GEORGE WAS DIAGNOSED WITH ACUTE LYMPHOSITIC LEUKEMIA, CANCER OF THE BLOOD AND BONE MARROW, WHAT THEY CALL A CHILD'S DISEASE. HE SUFFERED TERR*IB*LY. HE RECEIVED CHEMOTHERAPY PLUS HE HAD TO ENDURE TESTS ON HIS BONE MARROW, WHICH MEANT A NEEDLE INSERTED INTO HIS RIBS TO EXTRACT HIS BONE MARROW FOR TESTING. ON JAN. 15, 1977 HE DIED, JUST 5 DAYS BEFORE OUR SON TURNED 1, HE WAS 25 YEARS OLD. I NOW FOUND MYSELF A WIDOW WITH 2 SMALL CHILDREN, I WAS 23 YEARS OLD.

MY HEALTH PROBLEMS BEGAN IN 1989, IT STARTED WITH MY BACK AND I HAVE BEEN IN EXCRUCIATING PAIN EVER SINCE. I AM THANKFUL I HAVE A WONDERFUL HUSBAND WHO DOES EVERYTHING HE CAN TO HELP ME. HE HAS TAKEN ME TO NUMEROUS DOCTORS OVER THE PAST 20 YEARS.

MY MEDICAL HISTORY IS LONG AND COMPLICATED. JUST A FEW THINGS WRONG ARE, THAT AFTER 18 YEARS I WAS FINALLY GIVEN A NAME TO MY PROBLEM, FYBROMYALGIA, ALSO FAILED BACK SYNDROME, WHICH INCLUDES 3 FAILED BACK SURGERIES, FAILED SPINAL COLUMN STIMULATOR, MIGRAINE HEADACHES (TWICE A DAY), PLUS BONE AND MUSCLE DETIORATION, I HAVE 2 METAL DISCS IMPLANTED INTO MY BACK TO MAKE MY DISCS THE SAME SIZE PLUS TRY TO RELIEVE THE PAIN IN MY LEFT LEG DUE TO THE FACT THAT THE COLLAPSED DISC SAT THERE FOR 10 YEARS, SO NOW I HAVE PERMENANT NERVE DAMAGE. I ALSO HAVE 2 TITANIUM SCREWS FUSED TO MY SPINE.

I'VE HAD 24 DOCTORS OVER THE YEARS, MOST BAFFLED AS TO THE SEVERITY OF MY PAIN. I HAVE ALSO HAD 9 SURGERIES IN THE PAST 20 YEARS. THIS IS A LONG TIME TO BE IN CONSTANT PAIN. I AM NOW BEING TREATED WITH MORPHINE, I'VE BEEN ON IT SINCE 1999. I ALSO TAKE A TOTAL OF 41 PILLS A DAY, THAT'S DOWN FROM 68 PILLS BACK IN 2003. IN 2004 I LOST ALL OF MY TEETH DUE TO BONE DETIORATION, MY DENTURES NEVER FIT PROPERLY AFTER THAT, I HAD 4 FAILED SURGERIES ON MY MOUTH TO REPAIR 2 HOLES LEFT WHEN MY MOLARS WERE PULLED. IN 2006 I FINALLY HAD A SUCCESSFUL SURGERY AND THE

HOLES WERE FILLED, AND I FOUND A DENTIST THAT COULD REPAIR MY DENTURES SO I COULD WEAR THEM.

AS YOU CAN SEE, MY LIFE HAS NOT BEEN EASY, BUT MY STORY, SAD AS IT IS, THERE ARE THOUSANDS OF PEOPLE OUT THERE WITH STORIES JUST AS SAD AND TRAGIC AS MINE, PLUS THOUSANDS MORE THAT DO N0T KNOW ABOUT THIS STORY AT ALL.

IN MY OPINION ALL OF THE ABOVE MEDICAL PROBLEMS ARE CAUSED BY THE CONTAMINATED WATER AT CAMP LEJEUNE. I FEEL THIS IS A VERY IMPORTANT STORY, ONE THAT SHOULD BE TOLD. WE NEED THE HELP FROM THE MEDIA TO BRING THIS STORY TO LIGHT.

DURING THE 60'S AND 70'S OUR YOUNG SOLDIERS WERE FIGHTING A WAR IN VIETNAM AND LITTLE DID WE KNOW WHAT THE DEVISTATING EFFECTS AGENT ORANGE WOULD HAVE ON OUR YOUNG SOLDIERS AND THEIR FAMILIES.

THE MARINES HAS A MOTTO: "WE TAKE CARE OF OUR OWN", IT SHOULD BE "MARINES KILLING MARINES". I HOPE YOU WILL CONSIDER HELPING US, WE SURE COULD USE IT. IT'S TIME THIS GOVERNMENT "TOOK CARE OF IT'S OWN".

THERE IS A WEB SITE I HAVE REGISTERED ON. IT'S WWW.WATERSURVIVORS.COM WHEN YOU'VE LOST A LOVED, ESPECIALLY A CHILD, NO MATTER HOW MANY YEARS HAVE GONE BY YOU NEVER FORGET THEM.

I'M SO THANKFUL FOR THE LOVED ONES IN MY LIFE, MY HUSBAND, MY SONS, BUT ESPECIALLY OUR 6 BEAUTIFUL GRANCHILDREN. IT GOES TO SHOW YOU THAT NO MATTER HOW MUCH TRAGEDY ENTERS YOUR LIFE, THERE IS ALWAYS A BRIGHT LIGHT AT THE END OF THE TUNNEL.

THANK YOU,

SINCERELY,

CANDY LITTLE,
DALTON, MA.

October 8, 2009.

Hon. DANIEL K. AKAKA,
Chairman,
Committee on Veterans' Affairs,
U.S. Senate, Washington, DC.

Subject: Hearing on the VA/DOD Response to Certain Military Exposures

DEAR MR. CHAIRMAN: We thank you for holding hearings regarding military exposures to hazardous agents. We understand the hearings focus on a few locations your Committee has concerns about regarding potential health hazards. We are providing very brief comments for your consideration and the record. We request that you pursue actions to mitigate health problems arising from hazardous exposures at US military bases.

Marines and others who serve anticipate hazardous conditions will occur. While efforts should be made to minimize hazards, some activities are inherently dangerous and even lethal. We realize that knowledge of chemical hazards was neither as extensive nor widespread in past decades. But the degree of hazard is clearly indicated by the 130 current and former military bases that are federally-designated Superfund sites (Attachment 1). This designation requires extensive proof of hazardous chemical contamination. Carcinogenic, neurotoxic, and mutagenic chemicals were used during military duties (e.g., jet fuels and other fuels, degreasing solvents) without personal protective gear. Burn pits and other operations created additional toxic airborne chemicals, and often the soil, dust, and water on bases were contaminated. The burden of exposure and disease is only now being fully realized.

El Toro is one of many bases operated to serve US defense needs, manned by people who put their lives on the line to protect and defend our citizens. The prevalence of hazards on bases is illustrated by the example shown in Attachment 2. Many veterans have difficulty locating information on chemicals that they were exposed to, if they know that the information exits. Medical evaluations of their exposures and illnesses that may result in a Nexus statement are very expensive. Yet this is required to receive essential medical care and disability support. This process is indefensible given the substantial medical science available to the VA on chemical hazards.

While we welcome an opportunity to provide additional information, for the sake of brevity we request that your Committee carefully consider and prompt the VA to take the following actions essential to preserving the health of Veterans:

- Disclosure hazardous agents used on military bases, with information on potential health effects of the agents
- For those highly exposed to hazardous agents, provision of medical monitoring and access to tests for early diagnosis of diseases related to hazardous agents
- Medical care and disability for those with medical conditions related to their military service

Valuing the service provided by Veterans requires the VA and DOD's participation in basic public health outreach and services. This will provide the Veterans the best opportunity for good health, improve the economic viability of their families, and it is fundamentally the right and just thing to do. We are submitting these comments as Marines, family members of Marines, and health professionals working with Marines who served at the El Toro Marine Base in Irvine California.

Respectfully submitted by the following individuals,

ROBERT O'DOWD,
Somerdale, NJ, Marine Veteran, Former Financial Manager, Defense Logistics Agency

JAMES DAVIS,
Garden Grove, CA, Founder and President of Veterans for Change, Son of Marine

MARY DAVIS,
Garden Grove, CA, Former Judge Advocate General (JAG) employee, Wife of Marine

TIM KING,
Salem, OR, Marine Veteran, Journalist

BONNIE KING,
Salem, OR, Wife of Marine Veteran, Journalist

JOHNNY P. BARRON,
Desoto, TX, Marine Veteran, Sr. Systems Programmer

DR. KATHLEEN BURNS,
Lexington, MA, Director, Sciencecorps

DR. PHILIP LEVEQUE,
Forensic Toxicologist, Molalla, OR

DR. MICHAEL HARBUT,
Chief, Center for Occupational and Environmental Medicine, Royal Oak, MI, Chair, Science Committee, Michigan Agent Orange Commission, 1987–1988"

DR. DANIEL TEITELBAUM,
Denver, CO, Adjunct Professor, Colorado School of Public Health & University of Colorado at Denver

Attachments

Attachment 1. US Military Bases Federally Designated as Hazardous Waste Sites**

US Air Force	US Army	US Navy and Marines
Air Force Plant #4 (General Dynamics) Fort Worth TX	Aberdeen Proving Ground Edgewood MD and Aberdeen MD	Adak Naval Air Station Adak AK
Air Force Plant 85 Columbus OH	Alabama Army Ammunition Plant Childersburg AL	Alameda Naval Air Sta. Alameda CA
Air Force Plant PJKS Littleton CO	Anniston Army Depot Anniston AL	Allegany Ballistics Laboratory, Mineral Co. WV
American Lake Gardens/McChord AFB Tacoma WA	Cornhusker Army Ammunition Plant Hall County NE	Bangor Naval Submarine Base Silverdale WA
Andersen Air Force Base Yigo GU	Fort Devens Fort Devens & Sudbury MA	Bangor Ordnance Disposal Bremerton WA
Andrews Air Force Base Andrews AFB MD	Fort Dix Pemberton Township NJ	Barstow Marine Corps Logistics Base Barstow CA
Arnold Engineering Development Center Tullahoma/ Manchester TN	Fort Eustis Newport News VA	Brunswick Naval Air Station Brunswick ME
Brandywine DRMO Brandywine MD	Fort George G. Meade Odenton MD	Camp Lejeune Onslow County NC
Castle Air Force Base Merced CA	Fort Lewis Tacoma and Tillicum WA	Camp Pendleton Marine Base Camp Pendleton CA
Chanute Air Force Base Rantoul IL	Fort Ord Marina CA	Cherry Point Marine Corps Station Havelock NC
Dover Air Force Base Dover DE	Fort Richardson Anchorage AK	Concord Naval Weapons Station Concord CA
Edwards Air Force Base Edwards AFB CA	Fort Riley Junction City KS	Davisville Naval Construction Battalion Center N. Kingstown RI
Eielson Air Force Base Fairbanks AK	Fort Wainwright Fort Wainwright AK	El Toro Marine Corps Air Station El Toro CA
Ellsworth Air Force Base Ellsworth SD	Iowa Army Ammunition Plant Middletown IA	Indian Head Naval Surface Warfare Center Indian Head MD
Elmendorf Air Force Base Anchorage AK	Joliet Army Ammunition Plant Joliet IL	Jackson Park Housing Complex Kitsap Co. WA
F.E. Warren Air Force Base Cheyenne WY	Lake City Army Ammunition Plant Independence MO	Jacksonville Naval Air Station Jacksonville FL
Fairchild Air Force Base Spokane WA	Letterkenny Army Depot Franklin Co. and Chambersburg PA	Marine Corps Combat Development Quantico VA
George Air Force Base Victorville CA	Lone Star Army Ammunition Plant Texarkana TX	Marine Corps Logistics Base Albany GA
Griffiss Air Force Base Rome NY	Longhorn Army Ammunition Plant Karnack TX	Moffett Naval Air Station Moffett Field CA
Hanscom Air Force Base Bedford MA	Louisiana Army Ammunition Plant Doyline LA	Naval Air Development Warminster Township PA
Hill Air Force Base Hill AFB UT		Naval Air Engr CTR Lakehurst NJ
		Naval Air Station, Whidbey Isl Whidbey Isl. WA

Attachment 2 (continued): US Military Base Hazardous Waste Sites

US Air Force	US Army	US Navy and Marine
Homestead Air Force Base Homestead Air Force Base FL	Materials Technology Lab Watertown MA	Naval Amphib. Base Little Creek Virginia Beach VA
Loring Air Force Base Limestone ME	Milan Army Ammunition Plant Milan TN	Naval Computer & Telecommunications Master Station Eastern Pacific Wahiawa HI
Luke Air Force Base Glendale AZ	Natick Lab Army Research, Development, and Engineering Center Natick MA	Naval Indust. Reserve Ordnance Plant Fridley MN
March Air Force Base Riverside CA	New Brighton/Arden Hills New Brighton MN	Naval Security Group Activity Sabana Seca PR
Mather Air Force Base Mather CA	Picatinny Arsenal Rockaway Township NJ	Naval Surface Warfare Center Dahlgren VA
McChord Air Force Base Tacoma WA	Riverbank Army Ammunition Plant Riverbank CA	Naval Undersea Warfare Engr Station Keyport WA
McClellan Air Force Base McClellan CA	Rocky Mountain Arsenal Adams County CO	Naval Weapons Industrial Reserve Bedford MA
McGuire Air Force Base Wrightstown NJ	Sacramento Army Depot Sacramento CA	Naval Weapons Station Yorktown VA
Mountain Home Air Force Base Mountain Home ID	Savanna Army Depot Activity Savanna IL	Naval Weapons Station Earle Colts Neck NJ
Norton Air Force Base San Bernardino CA	Schofield Barracks Schofield HI	Navy Ships Parts Control Ctr Mechanicsburg PA
Pease Air Force Base Portsmouth/ Newington NH	Seneca Army Depot Romulus NY	New London Submarine Base New London CT
Plattsburgh Air Force Base Plattsburgh NY	Sharpe Army Depot Lathrop CA	Newport Naval Edu & Training Ctr Newport RI
Rickenbacker Air National Guard Lockbourne OH	Sunflower Army Ammunition Plant Desoto KS	Norfolk Naval Base Norfolk & Portsmouth VA
Robins Air Force Base Houston Co. GA	Tobyhanna Army Depot Tobyhanna PA	NWS Yorktown - Cheatham Annex Yorktown VA
Tinker Air Force Base Oklahoma City OK	Tooele Army Depot Tooele UT	Parris Isl. Marine Corps Depot Parris Island SC
Travis Air Force Base Travis AFB CA	Tracy Defense Depot Tracy CA	Patuxent River Naval Air Station Patuxent River MD
Twin Cities Air Force Reserve Base Minneapolis MN	Umatilla Army Depot Hermiston OR	Pearl Harbor Naval Complex Pearl Harbor HI
Tyndall Air Force Base Panama City FL	US Army/NASA Redstone Arsenal Huntsville AL	Pensacola Naval Air Station Pensacola FL
		Port Hadlock Detachment Indian Island WA
		Portsmouth Naval Shipyard Kittery ME

Attachment 2 (continued): US Military Base Hazardous Waste Sites		
US Air Force	**US Army**	**US Navy and Marines**
Williams Air Force Base Chandler AZ	Weldon Spring Former Army Ordnance Works St. Charles County MO	Puget Sound Naval Shipyard Bremerton WA
Wright-Patterson Air Force Base Dayton OH	West Virginia Ordnance Point Pleasant WV	So. Weymouth Naval Air Station Weymouth MA
Wurtsmith Air Force Base Oscoda MI		St. Juliens Creek Annex Chesapeake VA
		Treasure Isl. Naval Station San Francisco CA
		USN Air Station Cecil Field Jacksonville FL
US Coast Guard		Washington Navy Yard Washington DC
Curtis Bay Coast Guard Yard Baltimore MD		Whiting Field Naval Air Station Milton FL
		Willow Grove Naval Air & Air Reserve Station Horsham PA
		Yuma Marine Corps Air Station Yuma AZ

** Federally designated hazardous waste sites that come under US EPA's Superfund Program (also listed as National Priority List or "NPL" sites) are listed. Some base cleanup has been completed, and work continues at other bases. These facilities include active and decommissioned bases. Some locations house (d) operations for multiple branches of the Service. When multiple locations with the same name were listed, they were combined under one entry above. Many hazardous waste sites are not designated under Superfund for a variety of reasons, and so this is very unlikely to be a complete list of bases where chemical contamination indicates past exposure to chemical hazards.

The underlined text links to the US EPA's webpage for each base with some investigative documents, cleanup status, and lists of the toxic chemicals that were identified. The documents often contain inconsistencies, making it difficult to evaluate the nature and levels of exposure to hazardous agents at worksites, in base housing and in the elementary school on this base.

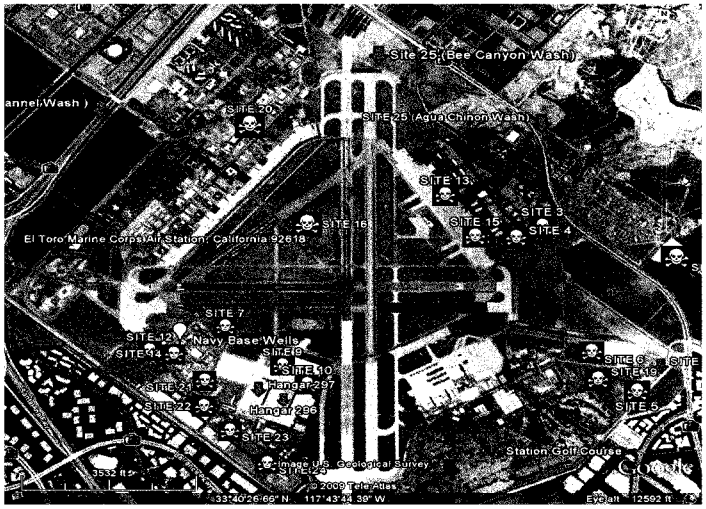
US EPA's individual site websites link to chemical contaminant lists that in turn link to health hazard information from ATSDR. ATSDR's chemical documents are often out of date, incomplete, and misleading. (See transcript of Congressional Hearings in 2008 regarding the quality of ATSDR's information.) Attachment 2 contains a link to the US EPA website for El Toro, as an example.

Attachment 2. Webpage with basic information on the former El Toro Marine base***

Former Marine Corps Air Station in El Toro, California is one of 130 military bases on the National Priority List (a federal Superfund site). The chemical contamination of soil and groundwater at El Toro is shared by many military bases. Millions of dollars were spent in remediation by the Navy. However, like other Veterans, no El Toro veteran was notified of the health effects of exposure to organic solvents, toxic metals, and other hazardous agents.

Mission Statement

The purpose of this website is to provide information to Marines and their dependents that lived and worked at MCAS El Toro about the contaminants in the soil and groundwater and the potential health effects of exposure to these contaminants.



The Navy identified 25 sites on the El Toro base with chemical contamination of soil and water that included arsenic, benzene, dioxin, TCE, chloroform, vinyl chloride, and other carcinogens, mutagens, neurotoxins, and developmental toxins (source: US EPA, 2009 at http://cfpub.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Contams&id=0902770. Many toxic chemicals were used in daily operations by Marines or were created through the use of burn pits and other processes.

Site 1- Explosive Ordnance Disposal (EOD) Range: Site is located in the northeast portion of the base in the foothills of the Santa Ana Mountains.

Site 2 - Magazine Road Landfill: During the 1970s, all solid waste from El Toro and some waste from MCAS Tustin were disposed in this landfill.

Site 3 -Original Landfill: Original Landfill, active from 1943 to 1955, encompasses approximately 11 acres and is located in the eastern portion of El Toro. *(This list of sites continues on the webpage.)*

***See http://www.mwsg37.com containing additional information on base contamination, health hazards, communications from Marines who served at the base, and related information. The webpage was developed by and relies on information assembled by a Marine Veteran who served at El Toro, Robert O'Dowd.

Jacksonville, NC, October 8, 2009.

Hon. DANIEL K. AKAKA,
Chairman,
Committee on Veterans' Affairs,
U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN, RANKING MEMBER BURR, AND OTHER MEMBERS OF THE SENATE VETERANS' AFFAIRS COMMITTEE: Thank you for taking the time to read my statement for the record regarding the toxic exposure at NAF Atsugi, Japan.

We cannot undo the fact that for nearly 18 years, roughly 3,000 families, every year, lived on NAF Atsugi Japan and was exposed to hundreds of toxic chemicals, including dioxin, volatile organic and inorganic chemicals, lead, benzene, mercury, cadmium, arsenic, trichloroethylene (TCE) Polychlorinated Biphenyls (PCBs), and other lethal toxins that exceeded Maximum Contaminant Levels (MCL), but we can support our Military Veterans', their families and provide them adequate health care and benefits.

For all that is human and right, please STOP allowing the Department of Navy (DON) to investigate itself. After the incinerator was shut down in 2001, the Navy did not take any action to notify personnel, provide information to US Department of Veterans Affairs (VA) or assist with health concerns until 2007, when former residents starting questioning their exposure at NAF Atsugi, Japan.

After my husband was diagnosed with Renal cell carcinoma (RCC): kidney cancer, in his early 40's, I started questioning Navy Medicine about the chemicals we were exposed to at NAF Atsugi, Japan, almost a decade earlier.

On 14 February 2007, the Navy and Marine Corps Public Health Center (NMPCHC) sent a team from Portsmouth, VA to Camp Lejeune, NC to meet with my husband and I. The members of this team included Captain Gillooly, Verona Walker, CDR Mohon, and Mary Ann Simmons. Capt. Gillooly and Ms. Walker worked on the Atsugi contamination issues and had a wealth of knowledge regarding the toxic exposure.

The DON continues to minimize the specifics surrounding this issue, another example, and I can give many, of this is the fact that the 2008 NAF Atsugi Health study eliminated the Central nervous system, liver and kidney damage in their report. This is because the NMCPHC concluded that the available literature was felt to be inadequate regarding the low levels reported in the Final Health Assessment in 2002.

However, let met point our specific facts, the Standard Form (SF) 600 that Navy Medicine added to our medical records in late 1997 stated we were exposed to 12 toxic chemicals that exceeded USEPA and New York State ambient air quality standards. I have provided some of the toxicological profiles as determined by the Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs™ for your reference for a few of those chemicals:

- Carbon Tetrachloride: High exposure to carbon tetrachloride can cause liver, kidney, and central nervous system damage.
- Mercury: Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus.
- Trichloroethylene (TCE): Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.
- Cadmium: Long-term exposure to lower levels of cadmium in air, food, or water leads to a buildup of cadmium in the kidneys and possible kidney disease.
- Dioxin: (VA provides benefits for those exposed to Agent Orange) Dioxins are believed to affect the growth regulation of cells. It can cause transient mild liver damage (hepatotoxicity), Peripheral nerve damage (neuropathy), Respiratory cancers, Multiple myeloma (malignant tumor of the bone marrow), Prostate cancer, Porphyria cutanea tarda (liver dysfunction and photosensitive skin lesions), Type 2 diabetes, Neurobehavioral development effects in infants.

As you can see, from the data, it was documented in past studies that former NAF Atsugi residents were being exposed to high levels of toxic chemicals that have been categorized by ASTDR to specifically damage our central nervous system, kidneys and liver.

Why did the NMCPHC removed these illnesses from the study? The only answer could be to continue to cover up how ill former Atsugi resident truly are with toxic related diseases and cancers.

Additionally, the Agency for Healthcare Research and Quality has determined that there are no screening recommendations for kidney or liver disease. For the NMCPHC not to recommend these tests along with the U.S. Preventative Services

Task Force guidelines for routine preventive care is a grave mistake and potentially life threatening for to many former Atsugi residents!

The Committee of Toxicology (COT) stated in the Review of the US Navy's Human Health Risk Assessment of the Naval Air Facility at Atsugi, Japan (2001) that there was, "The issue of plume-warning properties has not been addressed. Many contaminant concentrations are higher indoors than outdoors" (but the NAVY told us to go inside when the plum covered the base).

One step that was provided by the NEHC was to have our children wash their hands after being outside, however the COT states, "Washing of hands, forearms, face, tools, toys, and so on, after outdoor activities that result in direct contact with soil or dust is good advice and practice, but risk reduction by such measures has not been determined (Pioneer 2000; p. 93)."

The COT also recommended that NEHC use both approaches, to (surveillance) especially where data are already available. Surveillance can be either active or passive. However no health surveillance was performed by the DON.

In 2008, the NMPCH contract Battelle Memorial Institute to see if an additional population-based medical screening might be indicated.

The NMPCHC has a public Web site about NAF Atsugi, posted in 2007, available for former Atsugi residents with some study information, however, the Web site has not been widely publicized and many former Atsugi residents does not know of its existence.

Battelle recommended that children who were under 16 Respiratory Heath screening. The NMCPHC stated that NAF Atsugi children were compared to those living at Yokosuka failed to show any difference, so retesting any children who were under the age of 16 while living at NAF Atsugi was unnecessary. (The study states that untrained people were used to administer the test to the children and it appeared that some of the children were encouraged to blow harder.)

Battelle recommended for a Neuro-Behavioral outreach program from effects of lead exposure; The NMCPHC stated that there was a lead screening program in place at NAF Atsugi for much of the time that the SIC was in operation and that only 2 children had elevated lead levels out of 650 test from 1993–2001, therefore no additional counseling is required. (Even though, during a meeting with NMCPHC health officials, on 14 February 2007 while discussion as to why all children's lead levels were not tested as there was significant evidence to warrant testing for all children, CDR Mohon stated that it was determined that most the residential population utilized for the elevated blood test were children who lived at Navy Support Facility (NSF) Kamiseya.

Another recommendation was to evaluation of Current NAF Atsugi Soil Contamination. Soil sampling was conducted and heavy metals and dioxin levels were confirm to still be present in NAF Atsugi, Japan soil. Is NAF Atsugi still a health risk to residents?

Although I did petition for ATSDR to provide further studies on NAF Atsugi, Japan, the petition was denied. It was deemed not necessary as the DON has already concluded by 1995, "that there was sufficient and compelling evidence showing that VOC, PBCs, Pesticides, PAHs, dioxins and furans, particulars and heavy metals were released to the air at levels that exceeded EPA health risk based guidelines while the incinerator was in operation s from 1983–2001.

In June 2009 the NMCPHC published a long-term health effect that might be associated with the exposure of the SIC. The study admittedly has several faults or bias, which are as follows:

- Misclassification of Exposure,
- Occupational differences,
- Case identification (Clinical classification of disease),
- Overseas screening differences for respiratory illnesses,
- Environmental awareness,
- Selection of the comparison group,
- The Loss of follow up and that medical data for all persons in the study were not consistently available.

Even though they knew there were latency health risks, the NMCPHC did not produce an Atsugi registry until 2009. CDR McMillian, BUMED, has stated me that the data from the current NAF Atsugi Health Study will be used as registry. Unfortunately, the registry is inadequate data because of the lost of follow-up participates. The initial total active duty and family members included in the 2009 study for NAF Atsugi were 16804 people; however at the end of the study only 4504 people remained. This number also does not include more than half the people who were stationed at NAF Atsugi between 1983–2001, nor does it include civilian per-

sonnel and their dependents, children who were conceived but not born at NAF Atsugi and the medical data was not available for the entire study.

Additionally, former Atsugi resident have is the fact that the Selection of the comparison group was, Commander Fleet Activities Yokosuka, Japan (CFAY) because it shared the same environmental characteristics as Atsugi resident except for the exposure of the SIC.

CFAY was not an appropriate selection because of the soil contamination which included high levels of mercury and arsenic in the underground soil, discovered in 2001 within the residential area, where new high rises were being built. Additionally, in 1988 heavy metal contamination was discovered at Yokoula's berth 12, which lead to the groundwater near berth 12 to have lead contamination that was 250 times the Japan environmental quality standards in 1993–1994 timeframe.

Although the NMCPHC study states that there are significantly higher risks for dermal complains among the NAF Atsugi population, and Atsugi residents had higher incidents of liver cancer diagnoses, but the differences were not statistically significant than CFAY residents.

We also believe that the types of cancers and diagnosis codes allowed in the study were too vague, as it has been documented that Atsugi residents were exposed to over 200 toxic chemicals, to included Dioxin, which is already been recognized by the DVA for those exposed to agent orange.

I have asked the DON, several times for a list of cancer types and the numbers associated with cancer, however, I was informed by per CDR McMillian via email on October 6, 2009, that all my questions and or request now have to be sent through the Surgeon General, VADM Adam Robinson.

Why can the NMPHC not find cancer cases in the case study when I can find 59 cases of cancer in roughly 750 former residents? This includes, but is not limited to 8 cases of Brain cancer, 7 cases of Cervical Cancer, 6 cases of Thyroid cancer, 3 Leukemia and 3 Lymphoma. Other cases such as Kidney, Lung, Skin and Soft-tissue sarcoma's which has been linked to dioxin.

The Navy's track record regarding the SIC emissions clearly demonstrates a gross lack of concern for the long-term health and welfare of US military personnel and their families. Would it not be financially feasible and cost effective to contact former residents and ask them what cancers and illnesses they are suffering from? Remember the DON has already spent over 18 million on this subject. It is an abuse of power and a waste of government funding to continue to allow the DON to investigate this complex and life threatening issue.

There is no reason not to recognize well-established toxic links, illnesses and cancers to certain diseases that ASTDR has already documented, specifically the chemicals that exceeded MCLs at NAF Atsugi, Japan!

How many chances does the NMPCH have to get it right? The NMCPHC are professionals who primary jobs are to spin and embellish the truth about chemicals exposures with the DON, and when the questions get tough, they cutoff all communication. They continue to make the same mistakes, as military dependents are at risk today as I type this statement. Dependents are being exposed to toxins at Naval Support Activity (NSA) Naples and the NMCPHC is busy with their usual efforts of "risk communication." It is time that someone puts a stop to exposing military families to toxic waste!

According to DOD 4165.63M, DOD Housing Management dated September 1993, "The Installation Commanders Shall: (C1.4.6.1.) Provide excellent living conditions for all military personnel, eligible civilians, and their families and (C1.4.6.9) Protect members and their families from environmental and safety hazards in housing areas." It is evident that the DON failed to adhere to this specific Department of Defense (DOD) Directive, as the DON had full knowledge that toxic chemicals, which exceeded MCL, were being release by the SIC and polluting the residential area, which was confirmed to adversely affect NAF Atsugi's residents health and well-being, especially our children.

Finally, the Navy stated in 1998 in a Q&A sheet that if resident felt they were sicken by the SIC, they should file a claim. The results of our claims are as follows:

- The statue of limitations for timely filing of the claim was two years from the date of the incident and the claim was not received until almost a decade after the Parulis family left Atsugi. The lawsuit in 2000 and the purchase and closure of the facility in 2001 should have provided notice of the problems associated with the facility. The claim for injuries was not filed until 2008.
- The discretionary function defense protects the United States for decisions that are not required or mandated by law, but rather involve some element of judgment. This means that the United States Navy cannot be liable for its actions in this instance.

I formally request that Navy to notify, mass media/mailing, all those stationed at NAF Atsugi, Japan from 83–01 and record what type of disease/cancers which have been associate with all and any chemicals that were recorded to be over the levels of Maximum Contaminant Level (MCL) for air, soil and drinking water that was documented at NAF Atsugi, Japan. This should be done in a timely manner and not prolonged or put off as the Navy wishes.

Thank you for all your support in this matter, please contact me should you require further data. I have posted numerous DON studies and various supporting documentation at www.atsugi-incinerator-group.com

Best Regards,

SHELLY PARULIS,
Jacksonville, NC.

PREPARED STATEMENT OF SAM SIMS

Brooks Tucker
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My service number is #2507561, I joined the United States Marine Corp in October 1968. After basic training I went to advance training for eight (8) weeks at Camp LeJune North Carolina starting in February 1969. During that time I toured the entire base. I left in April 1969 for thirty (30) days of leave in which time I returned home. After leave I reported to sea duty for three (3) weeks. Afterwards I was stationed on USS Albany for thirteen (13) months, home port Mayport FL. Toured Mediterranean and Caribbean. During this time my baby girl Pam was born April 12, 1970. I was notified by the Red Cross while at sea that my baby was sick. I took emergency leave. Flew to Florida on military aircraft this was September 1970. After being home for several days my baby conditions worsen, we took her to the hospital my baby died the next day. During this time I tried to get help from the Red Cross and Navy Relief, no help given, so I borrowed money from my family to bury my baby and to report back to my duty station in November 1971 my rank was Sergeant. I reported to Camp LeJune North Carolina for duty.

My Wife gave birth to another baby girl Bridgett in December 1971, after being home on emergency leave our baby got sick and died in January 1972. Still no help from the Red Cross or Navy Relief we buried the baby and I reported back to Camp LeJune North Carolina. Forty Five days later got base housing at Terriah Terrace One. After staying in base housing for several months I got orders to report to Paris Island South Carolina as for Drill Instructor School. We went back and forth to Camp LeJune for training I obtained base housing at Paris Island. My wife was caring Twynetta my baby who died in September 1973. Still no help from the Red Cross or Navy Relief. After getting orders to Japan I was then questioned by superiors as to why my kids were dying for no apparent reason. After leave I reported to Japan for thirteen (13) months. Left Japan and was assigned to Camp LeJune forty five days after arrival I brought my family to Camp LeJune to Terriah Terrace Two (2) base housing. My daughter April started having medical problems a year before my discharge that continued after my enlistment. My enlistment time was up and I tried to reenlist but there were questions about my fitness and I was not able to reenlist. Then I went to Headquarters United States Marine Corp to plead my case as to no avail. After discharge I applied for VA benefits, school and health benefits. I was put on medicine for stomach problems and high blood pressure. I went to school for training and to help get work.

Twice in five years financial bankruptcy, then marital problems, my military life was destroyed. Superiors thought that my wife and I were killing our children, neighbor's outcast my family.

Because of out casting and loss of jobs I went into a state of depression and into a shell.

The VA then misdiagnose a problem with my wrist, I was told that I had cancer in my left wrist. After six (6) years and hundreds of doctors from Florida, Mississippi, Louisiana and Alabama thinking and being told my hand was to be cut off. Days before it happened I found out I had two (2) broken bones in my wrist.

As of now I have cases pending for disability for blood psi, stomach problems and wrist. New Orleans VA put a plate and screws in my left wrist. I am getting disability for PTSD.

This statement is made with the best of my knowledge.

Sam Sims

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