

Navy Medicine's Comments on the Battelle Report's Recommendations for Medical Screening Testing for NAF Atsugi Residents

Why did Navy Medicine contract for this analysis?

There have been several studies and reports related to potential adverse health effects associated with having lived aboard Naval Air Facility (NAF) Atsugi, a Navy aviation base located in Japan. The final Health Risk Assessment (HRA), dated June 2002, noted an increased risk for cancer, above the US background level, among those living aboard NAF Atsugi. Navy Medicine contracted with Battelle, an external agency private and independent from Navy, to answer a specific question: For those who lived aboard NAF Atsugi during the time of incinerator operation, what, if any, additional population-based medical screening might be indicated, and 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 testing or procedures 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 and provide early detection of diseases ranging from cancer to mental health conditions. These recommendations can be accessed at: <http://www.ahrq.gov/clinic/prevenix.htm>.

Navy Medicine's question was whether in addition to these already well established USPSTF recommendations, whether those who had lived aboard NAF Atsugi would require any additional testing for early evidence of disease not already evident by the presence of either signs or symptoms. This would also answer the concerns of those having lived aboard NAF Atsugi as to (1) what they, or their physicians, need to know about and (2) what, if any, medical problems could be expected solely as a result of having lived at NAF Atsugi.

What was the report's conclusion and recommendations?

From the 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, 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."*

Thus no additional screening or testing for disease that is not already evident is recommended.

Navy Medicine's Comments on the Battelle Report's Additional Opinions and Recommendations

Navy's commitment and efforts are best summarized in a quote from the report:

"It is important to note that during the years 1985-2001, numerous studies were conducted and an outreach program was initiated to keep the affected residents informed. The evaluations conducted at NAF Atsugi far exceeded those which would normally have been conducted in the civilian sector. Furthermore, one cannot dismiss the very sensitive political and diplomatic challenges related to a situation in which U.S. military personnel were attempting to close a privately owned civilian facility in a host country over which they had no control."

Navy Medicine's role at NAF Atsugi involved:

- Providing medical care and screening as part of the routine provision of care to our beneficiary population.
- Conducting two screening health risk assessments and the comprehensive health risk assessment for the NAF Atsugi incinerator issue
- Development and implementation of the health risk communication and health consultation plan
- Conducting two health studies – a Children's Respiratory Health Study and a Pregnancy Loss Study

Did the report provide any additional comments or opinions?

Yes. The authors provided their opinions and recommendations on what other efforts that Navy and Navy Medicine should consider for the study of NAF Atsugi residents. Navy Medicine agrees with the intent of all of the additional opinions/recommendations from the report's authors.

Battelle Report - Evaluation of Current Soil Contamination

“The soil in the residential and school/child care areas of NAF Atsugi may contain significant amounts of dioxins and heavy metals deposited during the years of SIC operations. Soil sampling was last completed in 1998-9, three years before the closure of the SIC. During those three years, it is reasonable to believe that additional toxic deposition occurred. To evaluate the current hazard, a soil sampling program in areas previously known to be affected should be conducted. If the contaminant levels are found that exceed current guidelines, then appropriate remediation and control measures should be immediately applied. Just as importantly, an evaluation determining that future utilization of such areas is of no concern to present and future residents will do much to relieve unnecessary anxiety and concern.”

Navy Medicine's comment - soil sampling:

Since completion of the public health assessment, Navy Medicine has not been involved with environmental conditions relating to the SIC. While Navy Medicine has subject matter experts that can provide guidance with soil sampling, this type of sampling is the responsibility of the base and may have already been conducted. The opinion/recommendation will be forwarded up the Navy chain of command for their consideration.

Battelle Report - Establishing an Outreach Program for Communication with Former NAF Atsugi Residents

“A formal and professional out-reach program for communication with former NAF Atsugi residents should be established. One of the many messages should be to encourage all former NAF Atsugi residents to follow the U.S. Preventive Services Task Force (USPSTF) guidelines for routine preventive care.

We recommend that the Navy establish (either within their own structure or perhaps to avoid the unintended perception of bias, through the engagement of an appropriate government agency), a medical communication activity staffed with specialists in risk communication and with health care providers who can effectively address the concerns of former NAF Atsugi residents.”

Navy Medicine's comment - outreach efforts:

Navy Medicine, through the Navy and Marine Corps Public Health Center (NMCPHC), has developed a website that provides all publically available documents related to NAF Atsugi and a Frequently Asked Questions (FAQ) section as a means of providing information to former Atsugi residents. We are adding information regarding the importance of the USPSTF guidelines as the best possible means of ensuring optimum health and the earliest possible detection of cancer or other diseases due to any cause.

The NMCPHC is Navy Medicine's lead agency for public and population health. They have professionals in the fields of Preventive Medicine, Environmental Health, Public Health, Population Health, Occupational and Environmental Medicine, Risk Communication and Epidemiology. The NMCPHC's website has a link allowing any medical care provider the opportunity to contact a physician directly for any additional information on possible environmental or industrial exposure information and recommendations for medical evaluation or testing. The staff at the NMCPHC are all highly trained professionals and we have full confidence in their ability to provide unbiased, scientifically accurate opinions and advice.

Battelle Report - Defining and Identifying the NAF Atsugi Cohort

"No program of medical surveillance is possible without identifying the subject population and establishing a registry by which the actions and findings of the program can be tracked. For the NAF Atsugi population creating such a registry is a very large task. This may best be accomplished by appointing a government agency to establish and maintain the registry."

Navy Medicine's comment – NAF Atsugi Cohort:

Navy Medicine has asked the NMCPHC to take an initial look at the NAF Atsugi former-resident population for any increased incidence of disease.

The Epidemiology Data Center (EDC) at NMCPHC is currently conducting a study to evaluate the NAF Atsugi former-resident population for any increased incidence of disease as compared with a similar population stationed at Yokosuka Naval Base. To conduct this study, the EDC will establish a database of all families living onboard NAF Atsugi from 1991 to 2001 and active duty personnel stationed at NAF Atsugi from 1985 to 2001.

Battelle Report - Child Respiratory Effects

“Children were appropriately considered to be at higher risk from the SIC emissions than adults. A medical evaluation should be conducted via the use of validated questionnaires (e.g., ATSDR, American Review of Respiratory Diseases [ARRD], or American Thoracic Society [ATS]) of respiratory health in individuals who were under the age of sixteen while resident at NAF Atsugi. For those indicating current respiratory symptoms, screening pulmonary function tests (e.g., forced vital capacity [FVC], Forced Expiratory Volume at one second (FEV)₁, FEV₁%, and forced expiratory flow at 25-75% [FEF 25-75%]) should be provided.”

Navy Medicine Comments - child respiratory effects:

The one study for respiratory effects in children failed to show a difference between the NAF Atsugi children with compared to those living at Yokosuka. Although there were concerns that the people administering the test were not fully certified to administer the test, it is very unlikely that such testers would be able to get a normal test from a child with abnormal pulmonary functions. The nature of the test, blow out as much air as possible as quickly as possible, can appear to be abnormal simply due to lack of effort. A trained technician will ensure that the effort is maximal so that there is no false abnormal result. A person with abnormal lungs cannot “fake” a normal result. Therefore it is very unlikely that the study failed to find children with abnormal pulmonary functions.

Since it has been several years (since 2001) since the incinerator was in operation, any delayed onset of pulmonary disease among children would have already happened. Thus any child that would ever develop pulmonary disease due to any exposure at NAF Atsugi would now have evidence of such disease.

To conduct a study by retesting asymptomatic children who were under age 16 to look for possible pulmonary disease is unnecessary due to reasons noted above. Further evaluation of children who now have pulmonary symptoms, due to any number of possible causes, through the use of a questionnaire and pulmonary function tests (PFTs) is a well accepted clinical option and is supported by Navy Medicine as sound clinical practice. Ideally, testing should be used to guide further therapy or monitor the results of current therapy.

Battelle Report - Potential Lead Effects

“Since there was a lead screening program in place at NAF Atsugi for much of the time the SIC was in operation, it should be possible to evaluate the lead levels among NAF Atsugi children and compare them with other children without the SIC exposure. If the mean lead levels among NAF Atsugi children were significantly above the screening level, or significantly higher than lead levels in children of comparable age from samples collected under comparable protocols at other naval facilities, consideration will need to be given to further follow-up of those children.”

Navy Medicine Comments – Potential Lead Effects:

The Navy Pediatric Lead Poisoning Prevention Program (PLPP), which has been in operation since 1994, utilizes questionnaires and blood lead levels to minimize risk of childhood lead poisoning. Children are appropriately tested and the results are discussed with the parents for any cases where blood lead levels are elevated. Recommendations to avoid lead exposure, reduce elevated levels, and the potential long-term consequences are discussed at that time. Any child with an elevated blood lead level is followed until the lead levels return to normal. No additional counseling is required as it has already been provided to any child with an elevated level.

In reviewing PLPP quarterly or summary data for NAF Atsugi from 1993-2001 only 2 elevated lead levels were found out of 650 tests, or 0.31%. Looking at other Navy facilities in Japan showed Yokosuka had 0.40% (5 out of 1264), Sasebo 0.59% (1 out of 169), and MCAS Iwakuni 0% (0 out of 198). For comparison against the U.S. population a CDC report (MMWR) dated December 22, 2000, reported blood lead levels of children aged 0 to 6 years varied by state from 2.7% to 14.9%.

To summarize, Atsugi pediatric blood lead levels showed no pattern of elevation compared to other US Navy installations in Japan or to CONUS data from areas at least as large as states. Given that Atsugi data exists from 1993 showing very low numbers of elevated pediatric blood lead levels, and that the PLPP was fully operational from 1994, there is no reason to expect anything would be gained by an “outreach program” or by further data analysis.

Contract No SP0700-00-D-3180

Delivery Order No. 0504

Task 644

Technical Report

**REVIEW OF NAF ATSUGI HEALTH RISK ASSESSMENTS
AND RELATED ENVIRONMENTAL DATA TO DETERMINE IF
ADDITIONAL POPULATION-BASED MEDICAL SCREENING
IS INDICATED**

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June 3, 2008

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TABLE OF CONTENTS

<u>EXECUTIVE SUMMARY</u>	<u>I</u>
<u>1. PROJECT DESCRIPTION</u>	<u>1</u>
<u>2. PREFATORY MATERIAL</u>	<u>1</u>
<u>3. ATSUGI PROBLEM</u>	<u>1</u>
3.1. BACKGROUND	1
3.2. INCINERATOR OPERATIONS	2
3.3. ESTIMATE OF THE EXPOSED POPULATION	2
<u>4. LIMITING CONSIDERATIONS</u>	<u>3</u>
4.1. MEDICAL SURVEILLANCE	3
4.2. MEDICAL EVALUATION	4
<u>5. RECOMMENDATIONS</u>	<u>4</u>
5.1. ACTIONS TO RESOLVE POTENTIAL CONTINUING HEALTH ISSUES AT NAF ATSUGI	5
5.1.1. EVALUATION OF CURRENT SOIL CONTAMINATION	5
5.1.2. ESTABLISHING AN OUTREACH PROGRAM FOR COMMUNICATION WITH FORMER NAF ATSUGI RESIDENTS	5
5.1.3. DEFINING AND IDENTIFYING THE NAF ATSUGI COHORT	5
5.2. MEDICAL EVALUATION AND SURVEILLANCE MEASURES	6
5.2.1. CHILD RESPIRATORY EFFECTS	6
5.2.2. POTENTIAL LEAD EFFECTS	6
<u>6. FINAL ASSESSMENT</u>	<u>6</u>
<u>7. ACRONYMS</u>	<u>8</u>
<u>8. REFERENCES</u>	<u>9</u>
<u>9. APPENDIX A: TEAM BIOGRAPHIES</u>	<u>10</u>
<u>10. APPENDIX B: LIST OF ATSUGI REPORTS REVIEWED</u>	<u>16</u>

Executive Summary

Battelle Memorial Institute (Battelle) was asked by the Navy & Marine Corps Public Health Center to review all health risk assessment data related to the Shinkampo Incinerator Complex (SIC) that operated adjacent to Naval Air Facility (NAF) Atsugi, Japan during the years 1985-2001, make a medical determination of what, if any, additional population-based medical screening might be indicated, and to provide the medically supported basis for that determination. Furthermore, if additional population-based medical screening was indicated, Battelle was to recommend screening parameters for it, to include the standard used and the expected outcome such screening would have on the population's health.

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 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. It is the opinion of the authors of this report that the following specific actions are indicated:

- Soil sampling should be conducted to evaluate the current hazard, if any, from residual pollutants deposited during the years of SIC operation.
- A formal and professional out-reach program for communication with former NAF Atsugi residents should be established. One of the many messages should be to encourage all former NAF Atsugi residents to follow the U.S. Preventive Services Task Force guidelines for routine preventive care.
(www.ahrq.gov/clinic/uspstfix.htm)
- The exposed NAF Atsugi population should be defined and identified as members of an Atsugi Registry.

Furthermore, the following medical evaluation and surveillance measures should be taken:

- A medical evaluation should be conducted via the use of validated questionnaires (e.g., Agency for Toxic Substances and Disease Registry, American Review of Respiratory Diseases, or American Thoracic Society) of respiratory health in individuals who were under the age of sixteen while resident at NAF Atsugi. For those indicating current respiratory symptoms, screening pulmonary function tests (e.g., Forced Vital Capacity, Forced Expiratory Volume at one second (FEV)₁, FEV_{1%}, and Forced Expiratory Flow at 25-75%) should be provided.
- A review should be conducted of pediatric lead levels at NAF Atsugi during the years of incinerator operation with a comparison to levels in children of comparable age collected under comparable protocols at other naval facilities. If the average lead levels are significantly higher among NAF Atsugi children (or significantly higher than the current screening level of 10 µg/dL) then counseling about the neuro-behavioral effects of moderate lead exposure should be provided through the outreach program.

The impact of these measures will, at best, provide an opportunity for secondary prevention either through recognition and management of existing problems such as chronic respiratory

disease or the early diagnosis of incident cases of long-latency medical problems. Although the numbers of individuals with health effects reasonably attributable to residence at NAF Atsugi is anticipated to be small, to the extent such surveillance and screening efforts are successful they would be expected to have meaningful benefit to those individuals.

It is important to note that during the years 1985-2001, numerous studies were conducted and an outreach program was initiated to keep the affected residents informed. The evaluations conducted at NAF Atsugi far exceeded those which would normally have been conducted in the civilian sector. Furthermore, one cannot dismiss the very sensitive political and diplomatic challenges related to a situation in which U.S. military personnel were attempting to close a privately owned civilian facility in a host country over which they had no control.

1. Project Description

In October, 2007, Battelle Memorial Institute (Battelle) was asked by the Navy and Marine Corps Public Health Center (formerly the Navy Environmental Health Center [NEHC]) to determine if population-based medical screening recommendations were indicated for U.S. personnel living and working aboard the Naval Air Facility (NAF) Atsugi, Japan, during the years 1985-2001. Battelle established an independent, expert panel of physician/scientists (see Appendix A for resumes) and reviewed all available published and non-published Navy and non-military reports related to human health risk assessment (HRA) of NAF Atsugi, Japan. This report summarizes the panel's findings and recommendations.

2. Prefatory Material

The volume of material created over the thirteen years in which environmental evaluations were conducted at NAF Atsugi is extensive. It consists of a series of environmental studies of progressively greater scope and sophistication. The conclusions of all of these evaluations are remarkable for their consistency: that residents of NAF Atsugi were exposed to ambient air and soil contaminants, due primarily to emissions from the Shinkampo Incinerator Complex (SIC) sufficient to produce an incremental increase in lifetime risk of cancer and to increase the risk of, primarily respiratory, non-cancer health effects.

Battelle was asked to review the work that has been done to see if identification can be made of medical measures to address the concerns of the individual residents at NAF Atsugi during the years the SIC operated. While one-on-one health consultations were publicized and made available to individual residents beginning in 1997, there is no documentation of the extent, efficacy or results of any past medical evaluations or surveillance. This report assumes that there is no current medical program specifically addressing the remaining concerns of former NAF Atsugi residents and there is no available repository of data on health effects experienced during the years of SIC operations.

Several early reports related to this subject refer to the Shinkampo Incinerator Complex as the Jinkampo Incinerator Complex. They are, in fact, one in the same.

3. Atsugi Problem

3.1. Background

NAF Atsugi is located on the site of a Japanese Air Force Base established in 1938 for defense of Honshu against anticipated air assaults by Allied air and naval forces after the onset of hostilities in the Pacific Theater of WWII. The U.S. Army assumed control of the facility in 1945 after the surrender of Japanese forces. It passed to the U.S. Navy in 1950 to support Navy Air operations in the Korean War and has remained a key naval forward base since that time.

NAF Atsugi occupies 1200 acres on the Kanto Plain approximately 25 miles from Tokyo. The principal orientation of the Base is North-South. The airfield and

supporting activities occupy the majority of the space on the east. The residential and other community areas occupy the western portion. In 1985 a private waste incinerator (Shinkampo Incinerator Complex, SIC) was built immediately southeast of the community area and commenced operation. The incinerator contained three furnaces and burned a wide variety of waste materials including liquid and solid industrial waste, municipal solid waste and construction debris. In addition, liquid waste and ash were stored on the premises in open areas adjacent to the incinerator structure.

The grade of NAF Atsugi is about 15 meters above the grade of the incinerator facility. The incinerator stacks ended at a height that released stack effluent at NAF Atsugi ground level creating a plume in the community areas of the base. Although the incinerator was equipped with pollution abatement equipment, direct observations of its operation indicated that those controls were routinely bypassed.

Complaints by the residents on Atsugi about air quality due to the incinerator plume led to a series of evaluations and attempts to quantify pollution levels emitted from the incinerator. The first of these evaluations was conducted in 1988. Subsequent environmental testing was conducted in 1990, 1994, 1997 and 1998-99 and HRAs were generated in 1989, 1995, 1998 and 2002. Health risk communication activities began in 1995 based on the 1994 air quality studies and the 1995 HRA. A formal program of Health Risk Communication and Medical Consultation was initiated in 1998. See Appendix B for a complete listing of relevant documents reviewed.

Demonstration of the health risk related to poor air quality at Atsugi led to efforts by representatives of the United States Government to close the incinerator. These efforts, after a number of years, resulted in a financial payment by the Japanese government to the incinerator operator to close it in May 2001.

3.2. Incinerator Operations

The incinerator had three furnaces. Each furnace was equipped with emission control systems on its effluent stream, but direct observation of the incinerator, by teams operating the environmental survey equipment, indicated that the emission control systems were frequently bypassed. The practice of the incinerator operator was to soak the solid waste to be incinerated with flammable liquid wastes. Air sampling suggested the liquid waste included both gasoline and industrial solvents.

Fugitive emissions and dust from the on-site waste and ash storage were also detected in the air and soil sampling program.

3.3. Estimate of the Exposed Population

No estimates of the exposed population during the years of incinerator operation (1985-2001) are available in any of the documentation. In order to arrive at an order-of-magnitude estimate, extrapolations were made from the description of the on-base population during 1998. At that time, NAF Atsugi had a population of about 3,500 active duty personnel and 1,700 dependents, of which about 1,100 were children. Assuming a typical residence time of three years, annual turnover in the base population

would be estimated to be about 1,700, of which 400 would be children. If this was characteristic of the population dynamic for the entire exposure period, then about 18,000 adults and 8,000 children would have possibly been exposed to the contaminated environmental conditions during on-station assignments of one to three years. In the case of dependents, a typical duration of exposure would have been three years.

4. Limiting Considerations

Theoretically, a wide spectrum of potential medical actions could be considered for those residing at NAF Atsugi during the years 1985-2001. The potential actions range from no action; to conducting a retrospective medical surveillance study of all residents (or specific higher risk groups such as young children) to determine if a higher than “normal” incidence of disease has occurred; to establishing a prospective medical surveillance program of all residents (or higher risk groups) to “watch” for a higher than “normal” incidence of disease; to the provision of one time or periodic medical exams for all personnel (or specific higher risk groups) living at NAF Atsugi during those years. However, there are scientific and medical factors that limit the usefulness and/or significance of many of these potential actions. The two critical limiting factors are the level of established risk and the population or cohort size.

While it is clear from a thorough review of the numerous reports that residents of NAF Atsugi were exposed to ambient air and soil contaminants that were sufficient to produce “an incremental increase in lifetime risk of cancer and increase the risk of respiratory non-cancer health effects”, that increase in risk was in fact relatively small. The estimate of an increase in cancer risk of approximately 1 in 10,000 should not be taken literally, as it makes a number of assumptions based on U.S. Environmental Protection Agency standard models that may not fit the actual population profile and the mobility of residents. It is, however, a useful guide to comparative risk in the aggregate. Given that risk assessment estimates are usually thought to be accurate within an order of magnitude, it is reasonable to assume that the actual [excess] cancer rate over a lifetime would be approximately 0.1 to 10 in 10,000 (roughly 0.01%), against a background rate in the U.S. population of about 41%, as estimated by the National Cancer Institute (1). There is no epidemiological study protocol, with or without biomarkers, capable of detecting the upper estimate of increased risk of 0.01%, and this limitation would still apply if the estimated risk were 100 in 10,000 or, given the relatively small size of the population, even 1000 in 10,000.

4.1. Medical Surveillance

Given the low incremental increase in cancer risk, retrospective epidemiologic surveys are unlikely to have sufficient statistical power to allow detection of health effects, particularly if they address only the active duty NAF Atsugi population. Epidemiologic analysis of a prospective medical surveillance program will have much more statistical power to detect effects and could be incorporated into the medical surveillance program with only a small additional increment in resources. It would provide important feedback for the surveillance program and allow adjustments and efficiencies in the surveillance protocols as data became available on any patterns of morbidity that

develop in the NAF Atsugi cohort(s) over time. It would also provide a unique scientific opportunity to identify lifetime health effects from complex pollutant exposures, which would help refine risk estimates.

4.2. Medical Evaluation

The non-cancer health effects of primary concern are changes in pulmonary function from exposure to inhaled respiratory toxicants (fine particulate matter smaller than 10 microns [PM₁₀] or smaller than 2.5 microns [PM_{2.5}], acid gases and irritant organics), particularly among the resident children at NAF Atsugi. Permanent impairment of pulmonary function can occur from several years of exposure to airborne pollutants in urban settings (2). Pulmonary injury due to exposure to air contaminants in childhood results in reductions in Forced Expiratory Volume (FEV) 25-75% that are disproportionate to lung size, i.e., a relative reduction in small airway function (Dr. W. James Gauderman, personal communication). It would be appropriate to perform a follow-up evaluation of respiratory health for individuals living at NAF Atsugi while under the age of 16 through a questionnaire survey about respiratory symptoms that occurred either during the residence at Atsugi or since that time. Individuals indicating pulmonary symptoms would be offered screening pulmonary function studies (e.g., forced vital capacity [FVC], FEV₁, FEV_{1%}, Forced Expiratory Flow 25-75% [FEF 25-75%]). This would serve the purpose of identifying individuals with objective evidence of reduced pulmonary function consistent with exposure to airborne contaminants. However, this screening process would not be able to conclude that the pulmonary function changes were due specifically to exposure at Atsugi. Studies to attempt to identify pulmonary function changes attributable to residence at Atsugi are possible in concept, but would require a level of effort well beyond the limits of practicality. For those with no evidence of adverse respiratory effects, no further respiratory evaluation would be required.

Medical evaluation that would address the whole spectrum of potential medical effects that the Atsugi exposure could theoretically cause requires a protocol that addresses, at least at the time of the first examination, the functional state of all the major organ systems and a comprehensive cancer screening. However, the background rates of various medical conditions present in the NAF Atsugi population would be much higher than any effects attributable to the exposure and, such exposure effects would be impossible to discern and appropriately attribute. Therefore, except for the issues noted below, we cannot recommend any additional targeted evaluations beyond those recommended for routine preventive medical care (3).

5. Recommendations

With the above discussion in mind, the recommendations that follow are presented in two categories. The first category addresses important actions that need to be undertaken to resolve potential continuing health issues and concerns at NAF Atsugi. The second category addresses recommended actions to develop and implement a program of medical follow-up for certain former NAF Atsugi residents.

5.1. Actions to Resolve Potential Continuing Health Issues at NAF Atsugi

5.1.1. Evaluation of Current Soil Contamination

The soil in the residential and school/child care areas of NAF Atsugi may contain significant amounts of dioxins and heavy metals deposited during the years of SIC operations. Soil sampling was last completed in 1998-9, three years before the closure of the SIC. During those three years, it is reasonable to believe that additional toxic deposition occurred. To evaluate the current hazard, a soil sampling program in areas previously known to be affected should be conducted. If the contaminant levels are found that exceed current guidelines, then appropriate remediation and control measures should be immediately applied. Just as importantly, an evaluation determining that future utilization of such areas is of no concern to present and future residents will do much to relieve unnecessary anxiety and concern.

5.1.2. Establishing an Outreach Program for Communication with Former NAF Atsugi Residents

Health risk communication and medical counseling did not begin until after the 1995 environmental and preliminary HRAs. So, it seems likely that very few of the NAF Atsugi residents during the initial ten years of incinerator operation have had the opportunity to learn about their exposure and potential health risk.

Currently, there appears to be a high level of concern among former NAF Atsugi residents. Unofficial web-sites and other lines of communication are appearing for residents to air their concerns. This is direct evidence of the need for more high-quality information and a proactive comprehensive approach to engaging in the information exchange process. We recommend that the Navy establish (either within their own structure or perhaps to avoid the unintended perception of bias, through the engagement of an appropriate government agency), a medical communication activity staffed with specialists in risk communication and with health care providers who can effectively address the concerns of former NAF Atsugi residents. The activity should be sufficiently staffed that individual questions can be addressed and answered. Given the long latencies of many of the potential health effects of concern, the activity should be considered a long-term commitment and remain available for former NAF Atsugi residents as long as there is demonstrable need on the part of the affected population.

5.1.3. Defining and Identifying the NAF Atsugi Cohort

No program of medical surveillance is possible without identifying the subject population and establishing a registry by which the actions and findings of the program can be tracked. For the NAF Atsugi population creating such a registry is a very large task. This may best be accomplished by appointing a government agency to establish and maintain the registry.

5.2. Medical Evaluation and Surveillance Measures

The HRAs recognized that there were areas of the base that received exposure in excess of the average levels and that children were more sensitive to the acute health effects of the Atsugi exposure.

5.2.1. Child Respiratory Effects

Children were appropriately considered to be at higher risk from the SIC emissions than adults. A medical evaluation should be conducted via the use of validated questionnaires (e.g., Agency for Toxic Substances and Disease Registry [ATSDR], American Review of Respiratory Diseases [ARRD], or American Thoracic Society [ATS]) of respiratory health in individuals who were under the age of sixteen while resident at NAF Atsugi. For those indicating current respiratory symptoms, screening pulmonary function tests (e.g., FVC, FEV₁, FEV_{1%}, FEF 25-75%) should be provided.

5.2.2. Potential Lead Effects

Since there was a lead screening program in place at NAF Atsugi for much of the time the SIC was in operation, it should be possible to evaluate the lead levels among NAF Atsugi children and compare them with other children without the SIC exposure. If the mean lead levels among NAF Atsugi children were significantly above the screening level, or significantly higher than lead levels in children of comparable age from samples collected under comparable protocols at other naval facilities, consideration will need to be given to further follow-up of those children.

6. Final Assessment

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 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 that incremental risk was relatively small (see discussion, Section 5) it would not be scientifically meaningful to provide broad medical screening for all potentially exposed personnel. It is the opinion of the authors of this report that the following remedial/policy actions should be taken:

- Soil sampling should be conducted to evaluate the current hazard, if any, from residual pollutants deposited during the years of SIC operation.
- A formal and professional outreach program for communication with former NAF Atsugi residents should be established. One of the many messages should be to encourage all former NAF Atsugi residents to follow the U.S. Preventive Services Task Force guidelines for routine preventive care (3) at www.ahrq.gov/clinic/uspstfix.htm.

- The exposed NAF Atsugi population should be defined and identified as members of an Atsugi Registry.

Furthermore, the following medical evaluation and surveillance measures should be taken:

- A medical evaluation should be conducted via the use of validated questionnaires (e.g., ATSDR, ARRD, or ATS) of respiratory health in individuals who were under the age of sixteen while resident at NAF Atsugi. For those indicating respiratory symptoms, screening pulmonary function tests (e.g., FVC, FEV₁, FEV1%, and FEV 25-27%) should be provided.
- A review should be conducted of pediatric lead levels at NAF Atsugi during the years of incinerator operation with a comparison to levels in children of comparable age collected under comparable protocols at other naval facilities. If the average lead levels are significantly higher among NAF Atsugi children, then counseling about the neuro-behavioral effects of moderate lead exposure should be provided through the outreach program.

It is important to note that during the years 1985-2001, numerous studies were conducted and an outreach program was initiated to keep the affected residents informed. The evaluations conducted at NAF Atsugi far exceeded those which would normally have been conducted in the civilian sector. Furthermore, one cannot dismiss the very sensitive political and diplomatic challenges related to a situation in which U.S. military personnel were attempting to close a privately owned civilian facility in a host country over which they had no control.

7. Acronyms

ARRD	American Review of Respiratory Diseases
ATS	American Thoracic Society
ATSDR	Agency for Toxic Substances and Disease Registry
dl	Deciliter
FEF 25 – 75%	Forced Expiratory Flow between 25% and 75%
FEV ₁	Forced Expiratory Volume at One Second
FVC.....	Forced Vital Capacity
NAF.....	Naval Air Facility
NEESA.....	Naval Energy and Environmental Support Activity
NEHC.....	Navy Environmental Health Center
NFESC	Naval Facilities Engineering Service Center
RTP	Research Triangle Park
SIC	Shinkampo Incinerator Complex
USN.....	United States Navy
USPSTF	United States Preventive Services Task Force

8. References

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2. Gauderman WJ; Avol E, Gilliland F, et al. 2004. The Effect of Air Pollution on Lung Development From 10 to 18 Years of Age. *New England Journal of Medicine* 351: 1057-1067.
3. U.S. Department of Health and Human Services, Agency for Healthcare, Research and Quality. 2007. U.S. Preventive Screening Task Force. <http://www.ahrq.gov/clinic/pocketgd07/index.html> (June 2, 2008)

9. Appendix A: Team Biographies

ROBERT E. BURR

EDUCATION

Clinical Fellowship, Endocrinology, Metabolism and Diabetes, Massachusetts General Hospital 1979-81

Post-doctoral Fellowship, Laboratory of Human Behavior and Metabolism, Rockefeller University 1975-1978

Intern and Resident in Internal Medicine, Mayo Clinic 1973-1975

Hahnemann Medical College MD 1973

Dartmouth College AB 1968

QUALIFICATIONS

Dr. Robert Burr is a practicing consultant physician in Salt Lake City, UT. He is also a Senior Consultant with the Occupational Medicine Group at the Battelle Eastern Science and Technology Center with a wide variety of experience in clinical, epidemiologic and programmatic issues in environmental medicine and public health. He provides occupational medicine oversight and teaching for the Chemical Materials Agency of the U.S. Army and the Chemical Stockpile Emergency Preparedness Program.

He has served as the Environmental Medicine Consultant to the U.S. Army Office of the Surgeon General, Medical Advisor for the U.S. Army Research Institute of Environmental Medicine and as specialty editor of the 3-volume title "Medical Aspects of Harsh Environments" of the Army Surgeon General's Textbook of Military Medicine Series. He has done graduate study on Occupational Epidemiology in the Work-Environment Department of the University of Massachusetts-Lowell and developed the graduate course on Health Effects of the Work-Environment.

Dr. Burr is Board Certified in Internal Medicine, Endocrinology, Clinical Nutrition, Occupational and Environmental Medicine, and Emergency Medicine. He has held teaching appointments at the Schools of Medicine at the University of California- San Francisco, the University of Illinois, the University of Massachusetts, Tufts University and currently at the University of Utah.

He has authored several handbooks on environmental medicine as well as a number of original articles and reviews. He has been an invited speaker in many forums and has lectured widely in all his specialty areas as well as organizing formal courses and curricula. Some of his other projects include the Hospital Emergency Management of Terrorist Incidents Course for the Department of Justice Nunn-Lugar-Domenici Domestic Preparedness Program; Principal Investigator for the "Comprehensive Assessment of VA's Capability to Enhance Medical Response to a Weapons of Mass Destruction Event", design of an epidemiologic study of the workforce at the Chemical Agent Munition Disposal

System, on-site HRA of the Boston University Tropical Biology Program at the Tiputini Biodiversity Station in the Yasuni National Park of Ecuador, a review of emergency admissions to the University of Utah Hospital due to hazardous materials exposure, and an educational program and workshop on ethical conflicts in occupational health practice for the American Industrial Hygiene Association.

ROGER G. MCINTOSH

EDUCATION

Residency, Occupational Medicine, U.S. Army Environmental Hygiene Agency, 1984

Master of Occupational Health, Harvard University, 1983

Internship, Internal Medicine, Walter Reed Army Medical Center, 1982

Doctor of Medicine, Tufts University, 1981

Bachelor of Science, Summa Cum Laude, Tufts University, 1977

QUALIFICATIONS

Dr. Roger McIntosh has been engaged in the practice of occupational medicine for the last 24 years in corporate industry and within the Army Medical Department. Dr. McIntosh is a Maryland-licensed physician, board certified in Occupational and Environmental Medicine, who has provided technical support in the fields of chemical agent toxicology, occupational epidemiology, health risk communication, substance abuse and dependency, medical continuous quality improvement, heat strain control and prevention, and chemical agent treatment management. In his present position as Director of Occupational Medicine Programs at the Battelle Eastern Science and Technology Center, he provides technical support in the areas of public health; medical surveillance for toxic agents and industrial chemicals; nuclear, biological, and chemical surety medicine; occupational health program design, implementation, and management; medical emergency response; and potential exposure evaluations for stockpiled chemical warfare agents. Dr. McIntosh has evaluated more than 40 workers exposed to sulfur mustard, nitrogen mustard, nerve agents, and NSCM binary precursors in industrial settings during the past 24 years of his career, and served in medical emergency response exercises as a Service Response Force Surgeon.

Dr. McIntosh has served as Director of Health Services at the Watervliet Arsenal Health Clinic, overseeing general occupational health services for a 2800 employee cannon manufacturing facility. He has also served as Consulting Medical Director to the U.S. Army Chemical Materials Agency, overseeing six occupational health clinics supporting chemical disposal operations, and as the Surety Consultant to the Office of The Surgeon General (OTSG). Dr. McIntosh has been a Continuing Medical Education Director for ACCME-accredited postgraduate medical education programs in occupational health since 1998 and as course director for the Toxic Chemical Training Course (TCTC) for Medical Support Personnel since 1989. Dr. McIntosh currently advises the OTSG NBC Surety Consultant on recommended policies, procedures and standards for worker suitability in support of the personnel reliability programs (PRP). He is a member of the Occupational Medicine Residency Advisory Committee at the Uniformed Services University of the Health Sciences in Bethesda, Maryland. He previously served as a Medical Corps Colonel in the U.S. Army Reserves, and as a member of the National Academy of Science's Committee on Toxicology.

Prior to his employment with Battelle, Dr. McIntosh was the Program Manager at Science Applications International Corporation (SAIC) for the FY07 CMA Medical Support Task.

His principal responsibilities included assisting in overseeing occupational health programs in support of chemical stockpile, non-stockpile chemical materiel (NSCM), and laboratory operations at CMA, MEDCOM, and the Edgewood Chemical Biological Center (ECBC). Dr. McIntosh also served as the Chairperson of the Medical Review Panel (MRP) for reviewing medical credentials and rendering privileging and scope of practice recommendations for CMA disposal clinics.

TEE L. GUIDOTTI

EDUCATION

Masters of Public Health, Johns Hopkins University, 1981

Doctor of Medicine, University of California at San Diego, 1975

Bachelor of Science, Biology, University of Southern California, 1971

QUALIFICATIONS

Dr. Tee L Guidotti is currently Director of the Center for Risk Science and Public Health and Chair of the Department of Environmental and Occupational Health in the School of Public Health and Health Services at The George Washington University Medical Center. Before joining the faculty of GW in 1999, he was for almost 15 years Professor of Occupational and Environmental Medicine at the University of Alberta, where he founded Canada's first accredited training program in the field and was named a Killam Annual Professor. Dr. Guidotti is a consultant to the Occupational Medicine Department within the Medical Readiness and Response Group of Battelle.

Dr. Guidotti studied biology with a special interest in marine biology at the University of Southern California. He went to medical school at the University of California at San Diego and did his thesis on a topic in inhalation toxicology. He trained in internal medicine, pulmonary medicine, and occupational medicine, becoming board-certified in these three medical specialties, and attained a public health degree at Johns Hopkins. He has conducted biomedical research as a Clinical Associate at the National Institutes of Health. He qualified by examination as a Diplomate of the American Board of Toxicology.

Most of Dr. Guidotti's scientific work has emphasized contributions in occupational epidemiology (especially related to cancer risk), toxicology (especially hydrogen sulfide), and occupational medicine (especially firefighters) and he continues to publish in these areas. Dr. Guidotti has published on a variety of topics involving risk perception and communication, community and workplace health promotion, health disparities and interactions among social and physical risk factors, indicators of health status of Native American and Canadian populations, and population health. Dr. Guidotti is an author of almost 250 papers and author or editor of five books. He is the Editor in Chief of *Archives of Environmental and Occupational Health*. In 2006-2007 he served as President of the American College of Occupational and Environmental Medicine.

He has been engaged in many community health assessments in his career:

- Swan Hills, a five-year evaluation of the health of communities living downwind and downstream from an explosion in a toxic waste incinerator.
- The Western Canada Study, a four-year, large-scale study of downwind effects of natural gas facilities on cattle and wildlife with field sites in four Canadian provinces.

- The Fort McMurray Demonstration Project in Social Marketing, a five-year study looking at health indicators responding to a community-based health promotion program in a northern industrial city.
- The County 20 studies, a series of case studies that emphasized the impact on a community of perceived cancer risk and related issues of risk perception.
- Kabwe, a city in central Zambia coping with extensive lead contamination in soil.
- Canada Creosote, a lengthy regulatory issue of groundwater contamination issue by wood preservatives at a site in Calgary.
- Lead in drinking water in the District of Columbia, as consultant on risk management to the DC Water and Sewer Authority.
- Numerous regulatory actions undertaken by local, provincial, state and federal regulatory agencies in the U.S., Canada, and Zambia. These have included tank leaks, abandoned sites, brownfields, environmental legacy sites (in Zambia), abandoned hazardous waste disposal facilities, landfills.
- Two terms as a member of the Institute of Medicine's Vietnam-Era Veterans and Agent Orange committee, involved in the preparation of five reports. Subsequently was a reviewer for IOM reports on disposition of the longitudinal study of Air Force personnel.

Dr. Guidotti has received numerous honors and fellowships during his career.

10. Appendix B: List of Atsugi Reports Reviewed

NEHC. 1995. Human Health Preliminary Risk Evaluation of Jinkanpo Incineration Complex Activities on Naval Air Facility Atsugi, Japan. U.S. Navy Environmental Health Center, Norfolk, VA.

NEHC. 1998. Screening Level Air Human Health Risk Assessment. NAF Atsugi, Japan. Technical Memorandum. U.S. Navy Environmental Health Center, Norfolk, VA.

NRC. 1995. Letter report to Admiral F.G. Sanford regarding the Committee on Toxicology's evaluation of the Navy's report Human Health Risk Evaluation of the Jinkanpo Incineration Complex Activities at the Navy Air Facility (NAF) Atsugi, Japan. National Academy of Sciences, Washington, DC.

NRC. 1998. Letter report to Admiral Engel Review of a Screening Level Risk Assessment of the Naval Air Facility at Atsugi, Japan. National Academy of Sciences, Washington, DC.

Pioneer (Pioneer Technologies Corporation). 2000. NAF Atsugi, Japan. Human Health Risk Assessment, Draft – Rev.:0. Prepared by Pioneer Technologies Corporation, Olympia, WA, for U.S. Navy Environmental Health Center, Norfolk, VA.

RTI (Research Triangle Institute). 1999. Statistical Analysis of Ambient Air Data for the NAF Atsugi Health Risk Assessment. RTI No. 7732-000. Prepared by Research Triangle Institute, Research Triangle Park, NC, for Navy Environmental Health Center, Norfolk, VA.

RTP Environmental Associates. 1995. Health Risk Assessment; Activities at the Jinkampo [sic] Incineration Complex and the Impacts on the NAF Atsugi, a report prepared for the Naval Facilities Engineering Service Center.

UAI (UAI Environmental, Inc). 1999. Quality Assurance Audit Report for the Ambient Air Quality and Meteorological Monitoring Program. Naval Air Facility Atsugi, Japan. Prepared by UAI Environmental, Inc., PA, for Commander, Atlantic Division Naval Facilities Engineering Command, Norfolk, VA.

Weston (Roy, F. Weston, Inc.). 1999. Quality Assurance Audit Report for the Air Quality/Meteorological Monitoring Program at the Naval Air Facility in Atsugi Japan. W.O. No. 10220-050-001. Prepared by Roy F. Weston Inc., West Chester, PA, for Commander, Atlantic Division Naval Facilities Engineering Command, Norfolk, VA.

Toxicological Assessment, NAF Atsugi, 6 September to 4 October 1988, conducted by the USN Aircraft Environmental Support Office, San Diego.

Naval Energy and Environmental Support Activity. 1991. Ambient Air Sampling at NAF Atsugi, Japan prepared by Naval Energy and Environmental Support Activity (NEESA), Port Huenema, CA., 2-170.

Naval Energy and Environmental Support Activity. 1990. On-Site Investigation of Incinerator Emissions Impacting NAF, Atsugi 8-13 August and 21-25 September 1990, conducted by NEESA staff.

Naval Facilities Engineering Service Center. 1994. Air Monitoring and Health Risk Assessment Report for NAF Atsugi July-September 1994, conducted by Naval Facilities Engineering Service Center.

United States Navy Aircraft Environmental Support Office. 1988. Toxicological Assessment, NAF Atsugi, 6 September to 4 October 1988, conducted by the USN Aircraft Environmental Support Office, San Diego.