



**Naval Facilities Engineering Command
And
Navy and Marine Corps Public Health Center**

Guidance for Communicating Vapor Intrusion at Environmental Restoration Sites

October 2014

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Acronyms and Abbreviations

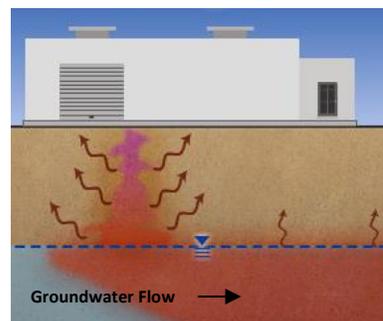
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO	Commanding Officer
DON	Department of the Navy
ERP	Environmental Restoration Program
FAQs	Frequently asked questions and answers
NAVFAC	Naval Facilities Engineering Command
NIRIS	Navy Installation Restoration Information Solution
NMCPHC	Navy and Marine Corps Public Health Center
OSHA	Occupational Safety and Health Administration
RPM	Remedial Project Manager
PPV	Public Private Venture
USEPA	U.S. Environmental Protection Agency
VI	Vapor Intrusion
VOC	Volatile Organic Compound

1. PURPOSE/STATEMENT OF INTENT

This guidance, prepared by Naval Facilities Engineering Command (NAVFAC) and Navy and Marine Corps Public Health Center (NMCPHC), is designed to provide Navy Environmental Restoration Program (ERP) Remedial Project Managers (RPMs) with recommendations for notifying and relaying information regarding vapor intrusion (VI) investigations to Base personnel and potentially affected occupants of industrial, office, or residential buildings. Ensuring a safe work environment for Base employees is a top priority for Department of the Navy (DON) officials. RPMs should use this guidance to assist project teams and Base officials with communicating plans and results of VI investigations and potential future actions in a timely and responsible manner. Although this guidance is intended to support RPMs, it may also be useful for environmental professionals managing potential VI outside of the ERP.

2. BACKGROUND

Vapor intrusion occurs when volatile organic compounds (VOCs) migrate from contaminated soil and/or groundwater into overlying buildings. Vapor intrusion investigations are typically conducted under the ERP to evaluate potential indoor air exposures and potential human health risks. A primary regulatory driver for these VI investigations is the *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*.



Potential VI sites are typically identified when soil or groundwater is contaminated with VOCs within 100 feet of a building. Over time, volatile chemicals present in soil or groundwater can evaporate and move into soil gas (the air in the spaces between soil particles). The VOCs in soil gas can enter overlying buildings through cracks or other openings in the foundations. VI investigations can involve a variety of samples including, soil gas, indoor air, and outdoor air. Soil gas samples taken directly beneath the foundation of a building (subslab soil gas) indicate what could be entering the building. Indoor air samples can be used to confirm if VI is occurring. It is important to recognize that VOCs found in indoor air may not be from VI, rather they may be present from products commonly used in homes and businesses (e.g., paints, gasoline machinery, cleaning products, dry cleaned clothing and cigarette smoke), or from outdoor air. When indoor air samples are collected, a building survey should be conducted to identify potential indoor background sources of VOCs and outdoor air samples should also be collected to identify VOCs that may be present from outdoor background sources. To evaluate if indoor air poses a potential health concern, samples are compared to conservative screening levels which can vary by state and federal agency. Section 8 provides a list of references and resources for additional information on VI.

Because the science of VI is complex and is typically unfamiliar to Base officials and building occupants, it is important for the RPM to communicate basic information about VI and the plans for and progress of VI investigations throughout the process. It is critical to convey this information early and often to prevent confusion, misperception, and fear about VI.

This guidance provides a framework for effective VI communication planning, incorporating the following:

- Objectives of VI Communication
- Audience and Stakeholders
- Key Messages
- Communication Strategy

3. OBJECTIVES OF VI COMMUNICATION

Remedial Project Managers and Base officials should communicate plans and results of VI investigations in a timely and responsible manner. The objective of outreach efforts should be to increase knowledge and understanding of the technical aspects of VI and the investigations being conducted including identifying subject matter experts to address questions and concerns commonly received about health effects from VI. Communication should allow for a two-way exchange of information between potentially affected building occupants and Base personnel and the NAVFAC RPM to identify questions and address concerns. This will help avoid potential confusion and misperceptions. It is important that VI information is conveyed clearly and concisely and that consistent information is shared with all stakeholders.

4. AUDIENCE AND STAKEHOLDERS

Stakeholder identification is the first step to developing an effective communication strategy. The primary objective of this step is to help ensure that potentially affected individuals or groups are informed and that messages are tailored to their level of knowledge and to specifically address their concerns and issues.

Everyone potentially affected by a VI issue is a stakeholder. This typically includes building occupants as well as those responsible for developing a communication plan and communicating the information. Key personnel to engage may vary Base to Base and building to building.

The first step is to identify:

- Chain-of-command responsible for the specific buildings and tenant commands affected. This includes all levels of management from the Base Commanding Officer (CO) down to first level supervisors and occupants in each potentially affected building

- Base Environmental Manager
- Base Safety Manager and Industrial Hygiene Specialist
- Public Affairs Officer
- Environmental Counsel
- Local human resources and/or union representatives
- Military Treatment Facility Occupational Medicine and Industrial Hygiene (local Navy hospital or branch medical clinic)

NAVFAC RPMs and key Base officials must understand their role in communicating VI information to building occupants and other stakeholders. Roles and responsibilities of key personnel and Base officials include:

- Base CO – approves VI communication plans and makes VI risk management decisions regarding building occupants
- RPM and Base Environmental Manager – provide VI subject matter expertise support to all stakeholders, collaborate with state and federal environmental regulators, and coordinate all aspects of VI investigations and communication efforts.
- Base Safety Manager and Industrial Hygiene – provide workplace safety subject matter expertise
- Public Affairs Officer (Base and/or NAVFAC) – approves official outreach materials and coordinates media and public communications
- Environmental Counsel – advises Base CO regarding liabilities and legal implications of risk management decisions
- Local human resources and/or union representatives – provide subject matter expertise for employee rights and coordinate outreach efforts with union employees
- Military Treatment Facility Occupational Medicine and Industrial Hygiene (local Navy hospital or branch medical clinic) – provide subject matter expertise for communicating potential exposures and health affects

5. KEY MESSAGES

The underlying objective of any VI communication is either to exchange information or convey a message. Developing key messages ensures consistency of information and helps prepare the DON officials to communicate with one voice to stakeholders. Key DON representatives should keep each other informed to ensure key messages remain current and statements or actions are consistent at all times. Good key messages provide a balance between giving people so much data and technical information that they are overwhelmed and oversimplifying information so much that important details are left out. The first step in developing key messages is to identify information stakeholders typically want to know, information commonly misunderstood, and information the DON should provide. For example:

Stakeholders generally want to know:

1. What is VI?
2. Why is a VI investigation being conducted and why not before now?
3. How will the VI investigation affect my daily routine?
4. When will the results be available?
5. What do the results of the VI study mean?
6. Has/will my health be affected by VI?

Information commonly misunderstood:

1. How health risks are determined
2. Why VI is regulated by the Environmental Protection Agency (EPA) instead of Occupational Safety and Health Administration (OSHA)
3. The role of Base safety and the industrial hygienist in implementing OSHA and RPM/Base Environmental in implementing EPA guidance
4. Technical information such as chemical names, concentrations (number overload) and scientific terms
5. The uncertainty of the science of VI
6. Inability to evaluate past exposure
7. Roles/Responsibilities of DON and state and federal regulators

Information the DON should provide:

1. DON Point of Contact
2. Assurance to occupants that their safety is the DON's first priority
3. Assurance that the DON will be proactive and take immediate action to protect human health
4. Explanation of technical information
5. Transparency of on-going VI planning, results and actions
6. Clarification of the collaborative efforts of DON with state and federal regulators

Effective key messages should be developed using simple sentence structure and everyday language, and should focus on conclusions and actions. Additional guidance on key message development is available in *Risk Communication Primer Tools and Techniques* (NMCPHC, http://www.med.navy.mil/sites/nmcphc/Documents/environmental-programs/risk-communication/NMCPHC_RiskCommunicationPrimer.pdf).

6. COMMUNICATION STRATEGY

Communicating VI to stakeholders should correspond with the milestones of a VI investigation. Typical VI milestones include:

- Plan initial VI investigation

- Conduct VI sampling
- Evaluate results and plan response actions
- Implement response actions

Communication strategies associated with each of these VI investigation milestones are discussed in detail in the following subsections.

Plan Initial VI investigation

The RPM should coordinate with Base environmental staff to identify the chain-of-command and who will communicate up the chain of command the initial plans for implementing a VI investigation. A briefing of this information should include:

- Summary of subsurface contamination (vapor source and VI introduction)
- Area/buildings to be investigated
- Timeline and description of planned investigation activities
- Explanation of uncertainties and any data gaps
- Summary of expected concerns of stakeholders
- Plans for sharing information (including key messages) with other stakeholders (e.g. Public Affairs, Base safety, Medical Treatment Facility/Occupational Medicine and Industrial Hygiene, environmental counsel, and building occupants)

After briefing the chain of command and incorporating their input, the RPM and Base environmental staff should collectively notify other stakeholders of sampling plans. This early notification is important because once sampling begins there is potential for follow-on questions and requests for information that may require advance preparation for involvement of these other stakeholders (e.g. Public Affairs, Environmental Counsel, Union Representatives, etc.).

It is also important to engage Base safety, industrial hygiene, and medical experts early in VI planning because they will likely receive questions from occupants and the chain of command regarding safety and health concerns and they may be requested to conduct immediate sampling to confirm indoor air safety while the VI investigation is being planned and conducted. The RPM should recognize the significant disparity in indoor air levels regulated by OSHA and risk-based values published by the EPA. It is critical to have discussions with Base safety, industrial hygiene, and medical, and to keep the Base CO informed because communicating this disparity will likely cause confusion. Consequently the RPM should consult the NAVFAC Environmental Restoration chain-of-command to identify indoor air screening levels and corresponding response actions prior to conducting indoor air sampling.

Conduct VI sampling

Building occupants should be notified that sampling will be occurring before any field work starts. The timing of this communication is important. The information should not be shared so

early that occupants may forget the information provided before sampling begins and not so late that the DON can be accused of not providing adequate time for building occupants to ask questions and gather information before the investigation begins. Typically two to three weeks prior to the start of sampling is an appropriate notification period.

There are several possible mechanisms for informing building occupants including: “All-Hands” notification from the Base CO, distributing fact sheets, briefing building superintendants or occupant supervisors to enable them to share information with personnel, holding a worker or community meeting (either Town Hall meeting or Open House Poster Session), and going building to building or office to office to share information directly. The RPM and Base environmental staff with input from Base leadership should collectively determine which of these mechanisms or combination of mechanisms will be most effective.

The focus of communication at this stage is to explain what VI is, what the potential health concerns are, if any, and how the initial VI investigations will affect occupant’s daily routine and when investigation results will be shared. Recognize that information regarding potential health affects will not likely be available at these early stages of planning and initiating VI investigations. Consequently, the RPM should be transparent with the information that is known and acknowledge when information is not available and/or unknown. Use the information provided previously in the Key Messages section as a basis for developing site specific key messages and summary information.

Evaluate Results and Plan Response Actions

The RPM will notify state and federal regulators of the final results in accordance with the CERCLA process. However, the RPM and key project stakeholders may consider sharing preliminary results when prompt communication is desired by building occupants or where potential health concerns warrant more immediate action. Based on the VI sampling results and input from the regulators and other stakeholders, risk management decisions regarding building occupants are made by the CO. For chain of command and occupants, the same mechanisms used to communicate initial VI planning information can be used to convey VI results and response actions. The communication challenges can vary depending on the results and planned response actions.

If results are below indoor air screening levels, communication is typically less challenging and the RPM should anticipate questions about the potential for past exposures and/or for VI to occur in the future. The RPM should make it clear that the ERP does not assess past exposures. The RPM should provide assurance that as long as there is a potential CERCLA vapor source from subsurface contamination the DON will continue to address the potential for VI to ensure protection of human health; however, the RPM should not make any guarantees that VI will not

be a potential future concern.

If results are above indoor air screening levels, the focus of the communication should be on explaining proposed response actions, how those actions will protect health and safety, and when the actions will occur. The RPM can anticipate that many questions and concerns will be related to past exposures and possible health effects. The RPM should make it clear that the ERP does not assess past exposures. Local occupational health medical professionals should be engaged to assist in communicating health effects information. Often workers are reassured when given the opportunity to meet privately with health care professionals to discuss potential exposures.

Questions regarding the disparity between indoor air evaluations under the OSHA workplace safety programs and EPA environmental programs will likely come up at this phase of communication. There is no simple explanation for this disparity, therefore RPMs should focus on explaining their environmental cleanup program and rely on Base safety and the Medical Treatment Facility/Industrial Hygiene to explain the OSHA program metrics. The challenge in addressing these questions is why the VI Planning section above recommends consulting NAVFAC chain-of-command to identify indoor air screening levels and response actions before conducting indoor air sampling.

Implement Response Actions

Similar to communication at the start of VI sampling, the RPM should provide information to the chain-of-command regarding potential impacts to daily operations from implementing the response action. These may include work stoppage, temporary relocation, noise, and construction activities associated with the following possible response actions:

- Additional or ongoing sampling
- Increasing ventilation (HVAC adjustments, fans, opening windows and doors, etc)
- Sealing foundation cracks to prevent vapor entry
- Installing indoor air purifying units
- Installing VI mitigation systems
- Permanent relocation

7. CONSIDERATIONS FOR RESIDENTIAL BUILDINGS

The basic communication process for VI in residential buildings is similar to the process for industrial/occupational buildings, but communicating with residents poses additional challenges because:

- Residences may or may not be a DON owned property (e.g. public private venture, off-base-leased housing, private property)

- Questions regarding relocation are more likely
- Potentially sensitive populations (children, elderly, sickly, etc.) may be present
- Greater exposure potential (24 hours / day) exists
- Property values may be affected
- State department of health is a likely stakeholder

When the residence is a non-DoD property, the property owner is the primary stakeholder and their approval is required before conducting any VI related activities. For public private ventures (PPV) the RPM will need to coordinate all interactions with residents through the PPV and/or DON Housing Office. In residential areas, it is critical to notify residents anytime VI activities are occurring in the neighborhood to avoid confusion, fear, and anger. The RPM must account for all of this additional coordination and approval when planning and scheduling their VI investigation.

Communication planning should include how to respond to requests for potential re-location of residence or installation of air purifying equipment even before a VI concern is identified. RPM should also anticipate requests for immediate indoor air sampling before the VI investigation is completed. If a public meeting is part of the communication strategy, consider hosting an “open-house” style meeting with poster stations manned by subject matter experts instead of the more traditional “town hall” style meeting with formal speakers followed by a public question and answer session. More information on public meeting formats is *Risk Communication Primer Tools and Techniques* (NMCPHC, http://www.med.navy.mil/sites/nmcphc/Documents/environmental-programs/risk-communication/NMCPHC_RiskCommunicationPrimer.pdf).

8. REFERENCES AND RESOURCES

NAVFAC Atlantic and NAVFAC Engineering and Expeditionary Warfare Center are available to provide technical support for VI investigations and the NMCPHC (<http://www.med.navy.mil/sites/nmcphc/contact-us/Pages/default.aspx>) is available to provide risk communication, risk assessment, toxicology, and occupational health and industrial hygiene support.

Links to the following list of principal VI guidance documents and resources are available in the Navy VI Tool accessible on Navy Installation Restoration Information Solution (NIRIS) under the “NIRIS Tool” menu:

- Navy Vapor Intrusion Policy
- DoD 2009 Vapor Intrusion Guidance
- Navy 2011 Guidance for Background Evaluation: Vapor Intrusion
- NAVFAC ERP website for Vapor Intrusion

- Interstate Technology and Regulatory Council, 2007 Vapor Intrusion Pathway: A Practical Guideline
- USEPA Vapor Intrusion Website
- USEPA 2008 Vapor Intrusion Attenuation Factor Database Technical Support Document
- USEPA Workshops and Conferences
- USEPA 2002 Vapor Intrusion Guidance
- USEPA Regional Screening Level Table and User's Guide
- Vapor Intrusion Guidance Documents by State

Additional resources including publicly available fact sheets can be found on the NAVFAC Workgroup Technology Transfer Information Tools website at http://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/tech/t2.html

Two VI videos are available on the NMCPHC website at <http://www.med.navy.mil/sites/nmcphc/environmental-programs/Pages/risk-communication.aspx>:

- Understanding Vapor Intrusion: A Guide to Key Concepts and Principals
- Understanding Vapor Intrusion: A Step-by-Step Guide to the Site Investigation Process

Examples of VI communication factsheets, posters, and frequently asked questions (FAQs) are provided in Appendices A, B, and C.

APPENDIX A

Examples of Fact Sheets and Notification Letters

- A.1: Naval Air Station Jacksonville – VI Investigation Fact Sheet for workers
- A.2: Naval Weapons Station Yorktown – VI Investigation Fact Sheet for workers
- A.3: Naval Weapons Station Yorktown – Trichloroethylene Health Information Fact Sheet for workers
- A.4: Little Creek Amphibious Base – Air Sampling Brochure for workers
- A.5: St. Julien’s Creek Annex – VI Fact Sheet for workers
- A.6: Joint Base Pearl Harbor Hickam – VI Investigation Notification Letter to private residences



Naval Air Station (NAS) Jacksonville

Operable Unit 3 (OU3)

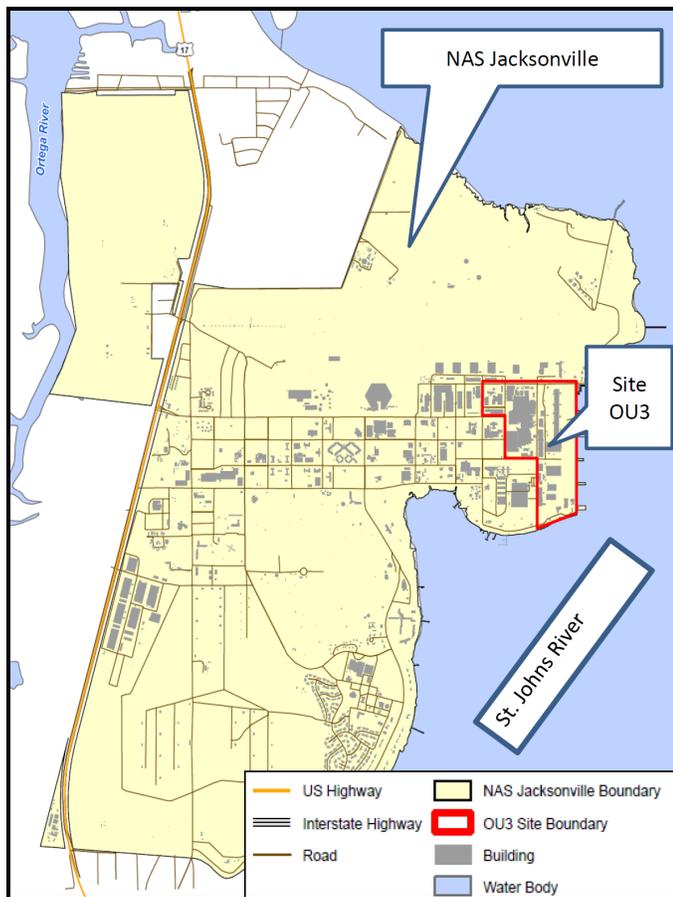
Vapor Intrusion Study

OU3 Vapor Intrusion Fact Sheet 2

April 2012

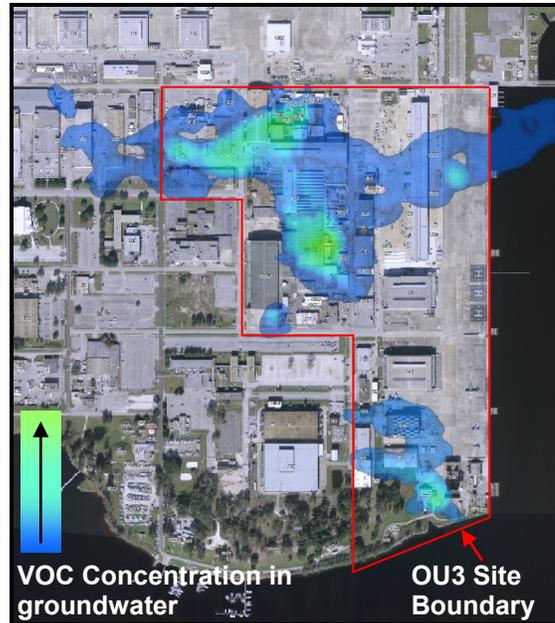
Introduction

OU3 is one of NAS Jacksonville's environmental cleanup sites. It is an industrial area, which occupies approximately 134 acres and contains approximately 167 buildings and structures in the northeast portion of the base. The majority of industrial activities within OU3 are associated with the Fleet Readiness Center Southeast (FRCSE).



The Navy has been conducting investigations and environmental cleanup work at OU3 since the 1980s. The groundwater beneath OU3 was found to be contaminated with volatile organic compounds (VOCs) as part of these investigations. Cleanup of some of the groundwater is being conducted through monitored natural attenuation, which relies on the natural breakdown of chemicals over time in the groundwater. Additional groundwater information is currently being collected to evaluate and select appropriate cleanup methods for a

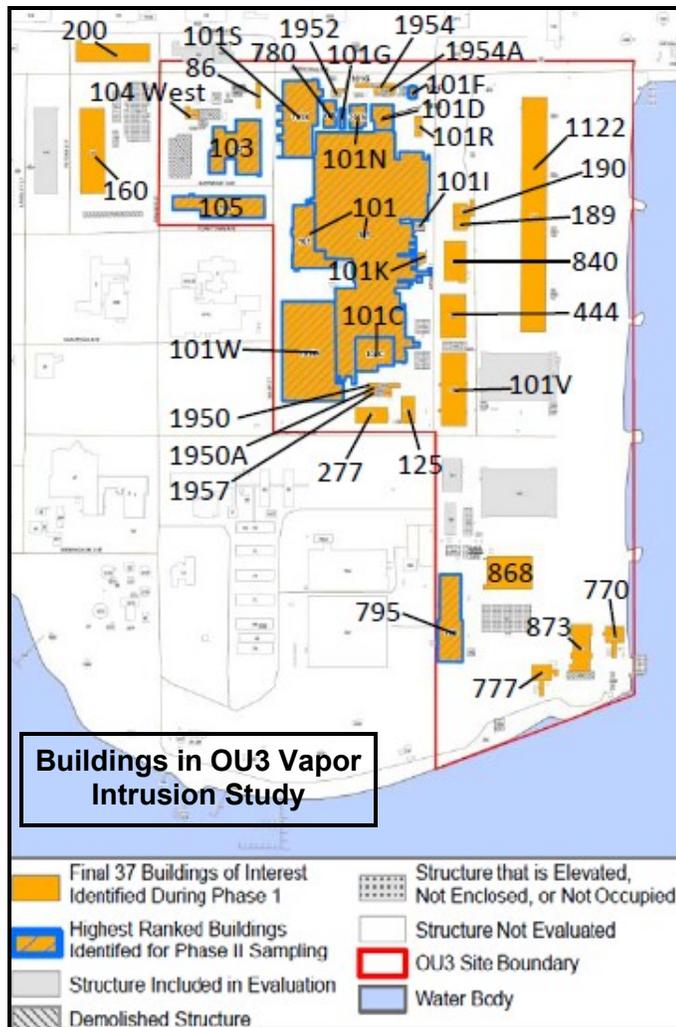
few other areas in OU3. The contaminated groundwater is **NOT** used for drinking water on-base or off-base.



Scientists in recent years have learned that certain VOCs (including many dry cleaning chemicals and chlorinated solvents used for degreasing metal) can evaporate from underground water and soil into indoor air in a process known as vapor intrusion. The Navy is currently conducting a Vapor Intrusion Study for occupied buildings within OU3 to ensure the indoor air is not being impacted by the groundwater contamination beneath the buildings.

Vapor Intrusion Study

The Navy has developed a work plan for a vapor intrusion study within OU3 which is consistent with EPA and DoD guidance. The work plan was developed using a large amount of groundwater data for OU3 from previous investigations as well as data from some small vapor intrusion studies conducted in the building 103 and 106 areas. The Vapor Intrusion Study will focus on occupied buildings where existing data indicates the potential for vapor intrusion. This includes buildings within OU3 that are known to be located within 100 feet of groundwater containing concentrations of VOCs that exceed the nationwide EPA screening values. We will also be studying occupied buildings where there is not enough data to rule out the possibility of vapor intrusion.



Buildings in OU3 Vapor Intrusion Study

The following 37 buildings will be included in the study: **86, 101, 101C, 101D, 101F, 101G, 101I, 101K, 101N, 101R, 101S, 101V, 101W, 103, 104 West, 105, 125, 160, 189, 190, 200, 277, 444, 770, 777, 780, 795, 840, 868, 873, 1122, 1950, 1950A, 1952, 1954, 1954A, and 1957.**

It's important to note that exceeding the EPA screening value means that more site specific information is needed to make a determination—it does not mean that vapor intrusion is occurring in a particular building.

Previous sampling conducted for Bldg 103 indicates the indoor air is safe based on USEPA standards. Sampling was completed inside Bldg 103 and/or in the parking lot area in 2009, 2010, and 2011 as part of a research project to better understand how chlorinated solvents behave in the groundwater and in clay soil and also as part of a DOD program to test new technologies for vapor intrusion sampling. Bldg 103 was selected because an area with known groundwater contamination was needed to conduct both the research and testing. All indoor air samples confirmed the air is safe inside Bldg 103 with all concentrations of VOCs below EPA standards for action or concern.

Samples taken beneath the parking lot and foundation of Bldg 103 confirmed there is VOC contamination in the groundwater and soil gas, which poses a potential for vapor intrusion. This potential further supports the need for a study focused on vapor intrusion in OU3 to ensure vapor intrusion is not occurring at levels requiring action. Additional samples will be collected from Bldg 103 as part of the first round of the OU3 Vapor Intrusion Study.

Sampling Plan

The OU3 Vapor Intrusion Study will include three types of samples: sub-slab vapor gas, indoor air, and outdoor air. Air samples taken from directly beneath the foundation of a building (sub-slab samples) show what can be entering the building and indicate if there is potential for vapor intrusion to occur. Indoor air samples are more for confirmation of the sub-slab results and to ensure the inside air is safe. Vapor Intrusion studies do not involve only indoor air samples because VOCs found in indoor air typically do not all come from vapor intrusion. Many materials and substances commonly found in homes and businesses contain VOCs that may be detected by indoor air testing. Some examples include: paints, paint thinners, gasoline-powered machinery, cleaning products, and cigarette smoke. Outdoor air samples are also taken to use as comparison to show the typical “background” concentrations.

All of the air samples for buildings within OU3 will be collected using specialized canisters which will collect air over an 8-hour period. Building occupants may also see technicians drilling small holes in the building foundation in preparation for the sub-slab sampling.



What's Next?

The sampling for the first round of the OU3 Vapor Intrusion Investigation will begin in late spring of 2012. The Navy, EPA and Florida Department of Environmental Protection (FDEP) have worked together to identify the following 12 buildings for the first round of investigation: **101, 101C, 101D, 101F, 101G, 101N, 101S, 101W, 103, 105, 780, and 795.** NAS JAX will have results on the first round of sampling to share with workers in summer 2012. The full Vapor Intrusion Study report should be available in January 2013.

For More Information

All site-related documents are available for review at the Navy information repository located in the Charles D. Webb-Wesconnett Regional Library, 6887 103rd Street, Jacksonville, FL 32210. If you have questions, please contact Mr. Mike Singletary at 904-542-6303 or email at michael.a.singletary@navy.mil.



Naval Weapons Station Yorktown Vapor Intrusion Investigation Barracks Road Industrial Area (Site 31) Shed 3 Indoor Air Sample Results

Site 31 Vapor Intrusion Fact Sheet 13

September 2012

Introduction

The Naval Facilities Engineering Command, Mid-Atlantic (NAVFAC Midlant) has been working with the United States Environmental Protection Agency (USEPA) and Virginia Department of Environmental Quality (VDEQ) to identify and cleanup sites at Naval Weapons Station Yorktown where previous practices could have resulted in contamination.

Volatile organic compounds (VOCs), including the chemical trichloroethene (TCE), have been found in groundwater samples in the Barracks Road Industrial Area (i.e., Site 31).

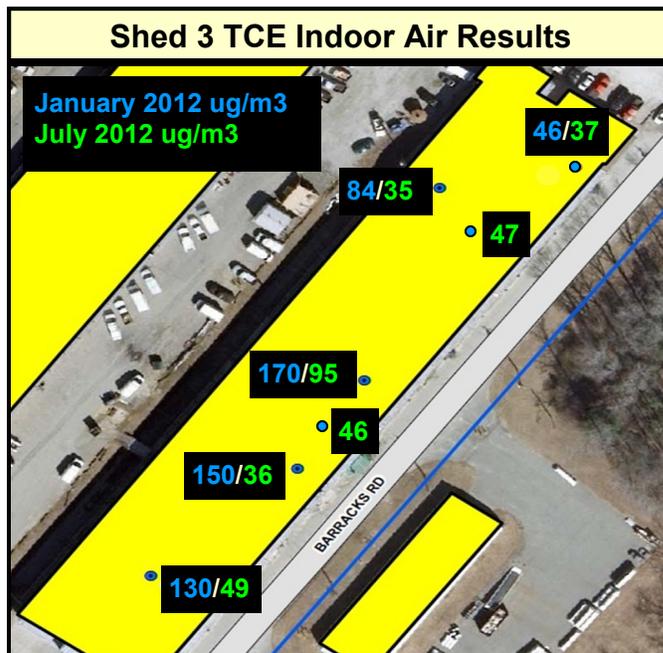
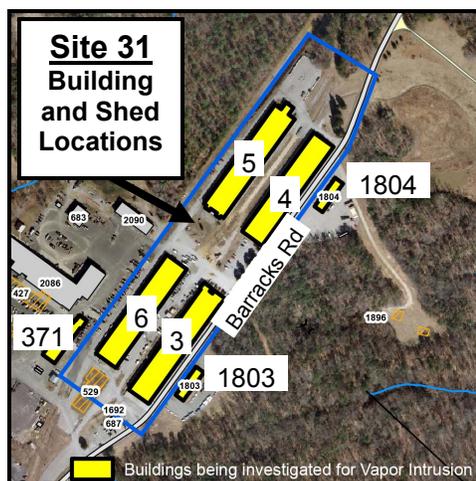
VOCs were used historically as solvents and degreasers in the Industrial Area and have

impacted the soil and groundwater at the site as a result of storage and/or disposal practices that were considered acceptable in years past. As part of the Navy's Environmental Restoration Program, NAVFAC Midlant is conducting an investigation to evaluate the potential for these chemicals to move from the soil and groundwater into the air inside buildings in the vicinity of Barracks Road (Sheds 3, 4, 5, and 6 and Buildings 371, 1803, and 1804) in a process known as vapor intrusion.

Indoor Air Results Shed 3

Indoor air samples were taken in Shed 3 in January 2012 as part of the Site 31 Vapor Intrusion investigation. Results indicated that TCE vapors had migrated into Shed 3. Workers were moved out of Shed 3 until environmental cleanup efforts at the site reduce the indoor air concentrations below the EPA recommended action limit of 26.4 $\mu\text{g}/\text{m}^3$.

Additional indoor air samples were taken from Shed 3 in July 2012. TCE concentrations decreased in July 2012, but were still above the EPA limit. The decrease is believed to be from seasonal variations (e.g., temperature) and building systems being off. TCE concentrations are expected to increase again if this building was sampled in the winter and/or if building systems are turned back on. Additional indoor air sampling is not planned while the building remains unoccupied. The TCE present in the soil and groundwater at Site 31 will continue to be investigated and cleaned up under the Environmental Restoration Program. This is a long-term process, which typically takes multiple years to complete.



Health Effects

Exposure to VOCs does not mean that adverse health effects will occur. Whether or not adverse effects will occur depends on a variety of factors including chemical concentrations, how long and how often the exposure occurs, the individual's sensitivity to the specific chemical, and the toxicity of the chemical. While we are not able to estimate past exposures in Shed 3, we recognize that workers may have questions about potential health effects from TCE. This information has been shared with Navy Medicine. Health care professionals at the Yorktown Branch Medical Clinic remain available to talk with workers about individual questions.

Additional Information

Additional information on TCE in the environment and potential health effects is available from the Agency for Toxic Substances and Disease Registry (www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=30) and USEPA (www.epa.gov/ogwdw/pdfs/factsheets/voc/tech/trichlor.pdf).

More information on the long-term environmental cleanup program at Site 31 is available on the Naval Weapons Station Yorktown Environmental Restoration website located at <http://go.usa.gov/yFb>.

Please contact **Mark Piggott, the NWS Yorktown Public Affairs Officer**, at (757) 887-4939 or email at mark.piggott@navy.mil if you have questions.



Naval Weapons Station Yorktown

Vapor Intrusion & Trichloroethylene (TCE)

Shed 3, Shed 6, and Building 371

March 2012

What is Trichloroethylene (TCE)?

Trichloroethylene (TCE) is a commonly used solvent for removing grease from metal parts. It is also an ingredient in adhesives, paint removers, and rug-cleaning fluids. It is a colorless liquid that has a slightly sweet odor similar to ether and chloroform.

What is Vapor Intrusion?

Vapor intrusion occurs when vapors from contaminated groundwater or soil seep up through cracks in building's foundations and accumulate in indoor air. In recent years, the Environmental Protection Agency (EPA) has required that vapor intrusion be investigated where groundwater contaminated with volatile chemicals (like TCE) lies near occupied buildings. Recent sampling indicates TCE vapor intrusion has occurred in Shed 3, Shed 6, and Building 371.

Will breathing TCE affect my health?

Breathing enough TCE can be harmful. A very high concentration (how much TCE is in the air), even for a short time, will harm everyone. A low concentration, if breathed for a long enough time, can also be harmful, but the effects of such "chronic exposure" are much harder to predict. Age, gender, diet, family traits, lifestyle (for example, drugs, tobacco, alcohol, and other chemicals a person is exposed to) and general state of health will affect whether a particular dose will be harmful to a specific person. Environmental cleanup guidelines, like those being used at Site 31, are set by the EPA at very low levels in order to protect even the most sensitive people from adverse health effects.

What are the health effects from breathing TCE?

Breathing large amounts of TCE may cause headache, dizziness, intoxication, weakness, loss of feeling or coordination, vomiting, double vision, unconsciousness, abnormal heart rhythms, and even death. High concentrations of TCE are irritating to mucous membranes, eyes, and respiratory tract.

Long-term exposure to TCE can damage the kidneys, immune system, nervous system, reproductive system, and the liver. TCE may also cause cancer of the kidney and, possibly, some other types of cancer.

However, the amount of TCE that was found was below the level that these symptoms would be expected to occur.

Is there a medical test to show if I have been exposed to TCE?

There is a breath test and a urine test made for workers who use TCE as part of their job. These tests should be performed immediately after exposure (within 24 hours). Testing for TCE in blood and urine after that period will generally show very low or undetectable levels. There is no test currently available to identify past exposure to TCE at the levels found in Shed 3, Shed 6, and Building 371.

Medical Consultations

The Branch Health Clinic (BHC) Yorktown is offering individual consultations for workers in Shed 3, Shed 6, and Building 371.

Appointments can be made by calling the Clinic at **953-8407**.

You told us before that sampling in Shed 3 showed the air was safe. Why is it not safe now?

The Occupational Safety and Health Administration (OSHA) sets workplace standards for workers exposed to TCE as an expected part of their jobs (for example, welders). Workplace levels of TCE acceptable to OSHA are about 500 times higher than the levels detected in Shed 3, Shed 6, and Building 371. When NWSY announced the air was safe, it was using the OSHA workplace standard.

However, because the workers in these buildings do not routinely work with TCE, the EPA feels that its environmental standards (for buildings, rather than workplaces) apply. The EPA uses different standards and approaches than OSHA. The EPA's guidelines are often more conservative to ensure even the most sensitive populations such as children and pregnant women are protected from future health effects. Because some of the measurements of TCE exceeded the EPA's standards, the EPA recommended actions be taken to reduce worker exposure to TCE in the air.

Part of the challenge facing NWSY has been to determine which TCE values apply: OSHA regulations (because it is a workplace) or EPA standards (because it is not a workshop that intentionally uses TCE). NWSY has decided to take the safest course of action and choose the EPA standard.

How much TCE was I exposed to in the past?

We do not have enough information to estimate historical air concentrations or past air exposures. Recently, the Navy began investigating vapors in indoor air as part of the environmental cleanup program. Because vapor intrusion is a new aspect of the cleanup program, we don't have information that would help estimate historical exposure levels from contaminated groundwater sources.

Can TCE build up in my body?

TCE can accumulate, but not like other chemicals of concern. For example, mercury from eating swordfish can build up for years and is only gradually eliminated once the person stops consumption of large predator fish. TCE reaches its maximum concentration after only 5 days, and, once exposure stops, levels quickly begin to decrease. Most of the inhaled TCE is actually metabolized (changed into other chemicals) and eliminated in urine.

Additional information on TCE in the environment and potential health effects is available from:

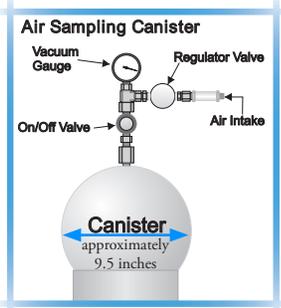
- Agency for Toxic Substances and Disease Registry - www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=30
- EPA - www.epa.gov/ogwdw/pdfs/factsheets/voc/tech/trichlor.pdf

sults of the indoor air samples indicate a potential problem, sub-slab vapor (air beneath the concrete building foundation) samples will also be collected.

Sampling the indoor air in the buildings will involve collecting a sample in a special canister and then sending it to a certified laboratory to be analyzed for site-related VOCs. Technicians will conduct the sampling within several portions of the first floors of the buildings identified.

The canisters used for sample collection are about the size of a volleyball. For collection of the indoor and outdoor air samples the canisters will be placed approximately 3 feet from the surface of the floor or ground. The canisters are under vacuum pressure. A valve allows air to slowly flow into the canister. After 24 hours, the technician will return to close the valve, pick up the canister, and send it to a laboratory.

Analysis usually takes 4 weeks for the laboratory to complete, and then the results are quality-checked to ensure accuracy. If vapors are found and determined to be coming from the groundwater, steps can be taken to prevent the vapors from entering the building. **The Navy will notify you when the results are available and a future plan of action is developed.**



AS A BUILDING OCCUPANT, WHAT SHOULD I DO?

Because it is not always easy to tell whether VOCs detected during indoor air sampling are due to background contamination, vapor intrusion from the groundwater, or both, you can help ensure the testing is accurate by avoiding some products and actions that could influence the sampling results.

- Avoid having freshly dry-cleaned clothing indoors. If you need to pick up some dry-cleaning, please wait until after the air sampling has been completed.
- Avoid using solvents or degreasers during the day of the air sampling.
- Avoid working on hobbies or projects that involve paint, varnish, glue, and similar products.
- Avoid using home cleaning products such as bathroom cleaners, furniture polish, appliance cleaners, all-purpose cleaners, floor cleaners, air fresheners, and odor eliminators.
- If you own guns, avoid cleaning them at least a week or so prior to the sampling event.
- Avoid using personal products such as nail polish remover, hair spray, and perfume.
- Do not touch the canister.
- Do not smoke indoors.
- Keep windows closed.

Thank you for your cooperation.

ES032009003WDC

FOR MORE INFORMATION

Mr. Bryan Peed - Project Manager, NAVFAC Mid-Atlantic (757-341-0480)

Mr. Scott Mohr - Public Affairs Officer, JEB Little Creek (757-462-8425)



Joint Expeditionary Base Little Creek—
Fort Story
JEB Little Creek

VAPOR INTRUSION INVESTIGATION PROGRAM

ENVIRONMENTAL RESTORATION PROGRAM
SITE 11, FORMER SCHOOL OF
MUSIC PLATING SHOP



March 2012

Contractors for NAVFAC Mid-Atlantic will be collecting air samples from within the School of Music (Building 3602) and its associated basement mechanical room, the Public Works Facility (Building 3615), and the bowling alley (Building 3560). Sampling is expected take place in March 2012 and June 2012, and will take approximately 5 days to complete during each event. The data collected during this timeframe will be used to evaluate the potential for vapor intrusion from a chlorinated solvent groundwater plume underlying or within 100 feet of the buildings. This brochure contains general information on the environmental restoration program, the vapor intrusion evaluation process, and how residents of the building can support the process.

INTRODUCTION

Joint Expeditionary Base (JEB) Little Creek–Fort Story was formed on October 1, 2009. JEB Little Creek (former Naval Amphibious Base Little Creek) was commissioned in 1945 to train landing-craft personnel for operational assignments. During the past 64 years, JEB Little Creek has expanded in both the area and complexity of its mission. JEB Little Creek personnel provide logistic and support services to 18 home-ported ships and more than 155 tenant residents.

Environmental personnel at JEB Little Creek and the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic in Norfolk, VA are currently working to conduct environmental cleanup and restoration at sites where historic disposal has been identified. This ongoing effort is being conducted with program oversight by the Virginia Department of Environmental Quality (VDEQ) in Richmond, VA and the U.S. Environmental Protection Agency (EPA) in Philadelphia, PA.

The purpose of this fact sheet is to provide key information about the low potential risk associated with vapor intrusion at Environmental Restoration (ER) Site 11, Former School of Music Plating Shop, and to identify a point-of-contact (located on back of pamphlet) to answer additional questions about the ongoing environmental cleanup program.

WHAT IS VAPOR INTRUSION?

Vapor intrusion occurs when vapors from contaminated groundwater or soil evaporate and then seep up through the soil and enter buildings through cracks and holes in foundations or slabs of buildings. At sufficient concentrations, these vapors could potentially pose a health risk to those who inhale them.

A variety of factors can influence whether vapor intrusion will occur at a building located near soil or groundwater contaminated with VOCs (a volatile organic compound is a class of chemicals that readily evaporate at room temperature). These factors include:

- Concentration of the contaminants
- Type of soil
- Depth to groundwater
- Construction of the building
- Condition of the foundation or slab
- Existence of underground utilities, which can create pathways for the vapors to travel



Not all chemical vapors found indoors come from contaminated soil and groundwater. Many materials and substances commonly found in commercial and residential settings contain VOCs that may be detected by indoor air testing. These include: paints, paint thinners, gasoline-powered machinery, certain building materials and cleaning products, certain types of personal products, dry-cleaned clothing, and cigarette smoke. Even VOCs from motor vehicle emissions and other outdoor sources can contaminate indoor air. When VOCs from these types of sources are detected during indoor air sampling, they are referred to as **background contamination** because the chemicals are not present as a result of the soil or groundwater contamination.

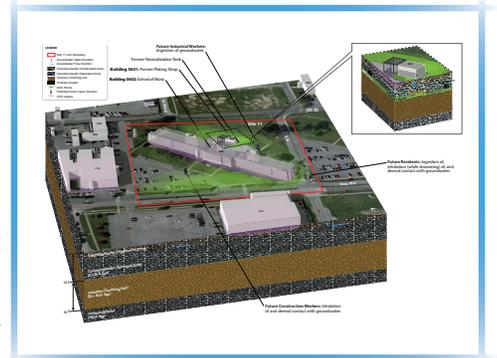
SITE DESCRIPTION AND HISTORY OF INVESTIGATION

Site 11 is centrally located in the industrial area of JEB Little Creek and consists of the School of Music, a storage building (Building 3651, formerly the plating shop), an asphalt parking area, and a landscaped lawn.

During operation of the former plating shop, small quantities of plating baths, acids, and lacquer strippers were disposed of into an in-ground neutralization tank and eventually piped into the storm sewer system.

The neutralization tank, piping, and surrounding soil were removed in 1996.

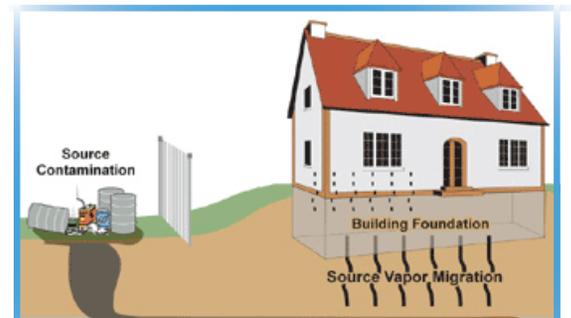
Environmental investigations completed to date have involved testing groundwater and soils around the School of Music and Building 3651. Results of these investigations revealed that the groundwater contains chlorinated VOCs, including trichloroethene (TCE) and vinyl chloride, as a result of a potential release from the former neutralization tank associated with the former plating shop. Volatile organic compounds (VOCs) are chemicals that evaporate easily at normal temperatures. Gasoline, dry-cleaning fluid, and solvents are all VOCs. If these types of chemicals spill or leak onto the ground, VOCs may enter the soil and groundwater below.



VAPOR INTRUSION INVESTIGATION PROCESS

The EPA recommends investigation of vapor intrusion if VOCs are detected within 100 feet of a building. Because groundwater at Site 11 is contaminated with VOCs underlying or within 100 feet of Buildings 3602, 3615, and 3560, it is important to investigate the buildings for possible vapor intrusion. The potential risk from vapors entering the indoor air of the buildings is considered to be low because there is a layer of clean groundwater above the groundwater that contains VOCs.

However, the Navy, in partnership with the EPA and VDEQ, have agreed to sample indoor air at Buildings 3602, 3615, and 3560 to confirm that vapors from contaminated groundwater have not affected the air inside the buildings. Building 3651 is not currently occupied and therefore does not require sampling. If re-



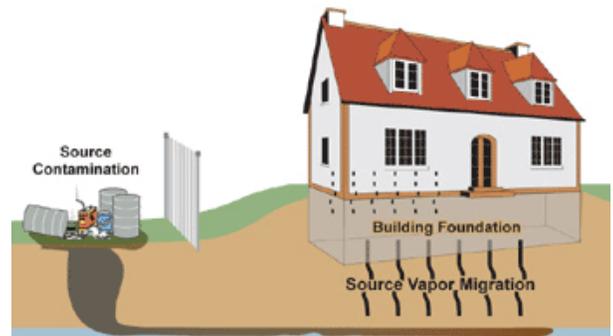
Chemicals that evaporate easily are called “volatile” chemicals. Under certain conditions, volatile chemicals can move from underground soil and groundwater up through cracks in foundations and slabs into the indoor air of overlying buildings through “vapor intrusion.”

Naval Facilities Engineering Command
Mid-Atlantic (NAVFAC MIDLANT)
Point of Contact: Mr. Walt Bell, P.E.
Phone: (757) 341-0484



What is “vapor intrusion”?

Vapor intrusion is the process by which volatile chemicals move from an underground source into the indoor air of buildings or other enclosed structures. Soil vapor, or soil gas, is the air found in the spaces between soil particles. Over time, volatile chemicals present in the subsurface soils or groundwater can move into and contaminate the soil vapor. Normal heating, air-conditioning and ventilation systems can create a negative pressure inside buildings that draws these soil vapors from the ground into overlying buildings. Under certain conditions, soil vapors can enter buildings through cracks in slab floors, basement floors, sump pumps or wherever electrical wires or pipes penetrate the foundation.



Chemicals that evaporate easily are called “volatile” chemicals. Under certain conditions, volatile chemicals can move from underground into the indoor air of overlying buildings through a process known as “vapor intrusion”.

Why is the potential for Vapor Intrusion being monitored at Site 21?

The Naval Facilities Engineering Command, Mid-Atlantic (NAVFAC MIDLANT) has been working with the Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality (VDEQ) to identify and cleanup former waste storage and disposal sites at Saint Julien’s Creek Annex (SJCA) in Portsmouth, VA. Part of this process requires groundwater in the industrial area to be sampled and analyzed to determine if it has been impacted by historic operations on the facility. During the course of this study, Volatile Organic Compounds (VOCs) were found in the groundwater and soil at Site 21. One of these compounds, trichloroethylene, or TCE, is a volatile solvent known to be associated with vapor intrusion issues at other areas across the United States.

It is thought that these compounds were used as industrial cleaners and found their way into the groundwater due to disposal practices that were considered acceptable at the time. Based on the type of chemical, the shallow-depth of the groundwater and the proximity to occupied buildings, NAVFAC MIDLANT concluded that additional studies should be conducted to evaluate the potential for vapor intrusion at Site 21.

Can vapor intrusion at Building 47 and 1556 affect my health?

Exposure to a volatile chemical does not necessarily mean that adverse health effects will occur. Whether or not adverse health effects occur can depend on a variety of factors:

- Toxicity of the chemical;
- Concentration of the chemical;
- Duration and frequency of exposure; and
- The individual’s sensitivity to the specific chemical.

The results from the previous investigation indicate that there is a potential for vapor intrusion at Buildings 47, 54 and 1556 in the industrial area. Using results of sampling at the site, the Navy ran a risk assessment to determine the risks to workers in the building. **The risk analysis indicates that there is no risk from vapor intrusion to employees currently working in the occupied buildings at Site 21.**

However, there is uncertainty for the future related to unpredictable increases in the concentrations in the groundwater which could contribute to changes in the vapor intrusion. Since the long-term health and safety of our workers is of primary concern, NAVFAC MIDLANT is planning to conduct additional monitoring to Current plans are to conduct site-specific sampling and analysis in buildings 47 and 1556 over the coming months beginning in April 2011.

What additional testing can be done? What are the next steps?

There are a variety of sample locations methods that will be used to help define the actual extent of contamination:

- **Sub-slab Vapor Samples:** These samples are collected to characterize the contamination in the soil directly beneath a building with a basement or slab foundation. Sub-slab soil vapor results are used to determine current and potential future human exposures based on actual vapor levels beneath a building.
- **Indoor Air Samples:** These samples are collected to characterize the indoor air quality in a specific building. Indoor air sample results help to evaluate whether there are current human exposures to volatile chemicals in the indoor air of a building. **Indoor air samples must be used with caution as they do not tell you what percentage of the volatile chemicals detected are actually being caused by vapor intrusion.** As there are many potential sources of volatile chemicals in indoor air, precautions must be taken to minimize the use of volatile chemicals in the building prior to sampling.
- **Outdoor Air Samples:** These samples are collected to characterize site-specific background air conditions. Outdoor air samples are used to evaluate the extent to which outdoor sources (example: automobiles, lawn mowers, oil storage tanks, industrial facilities, etc.) may be affecting indoor air quality.

Current plans include a building survey, utility clearances, and additional sampling and analysis in the coming months. This information will be used to monitor changes, evaluate if the changes indicate vapor intrusion could potentially pose a long-term health risk to our workers on-site, and determine the next course of action. We will continue to keep you informed of our progress throughout this ongoing process.

Where can I go for more information?

For information regarding the ongoing cleanup program at St. Julien's Creek Annex, please contact the NAVFAC MIDLANT remedial project manager at (757) 341-0484 or see:

https://portal.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_env_pp/env_restoration_installations/lant/midlant/sjca

As the science regarding vapor intrusion is constantly evolving, please see the following websites for the latest guidance and additional resources:

<http://www.epa.gov/waste/hazard/correctiveaction/eis/vapor/complete.pdf> ;

<http://www.itrcweb.org/guidancedocument.asp?TID=49> ;

and

<https://www.denix.osd.mil/portal/page/portal/denix/environment/cleanup/WN/DoD%20VI%20Handbook%20Final%20Jan%202009.pdf>



DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, HAWAII
400 MARSHALL ROAD
JBPHH, HAWAII 96860-3139

5090
Ser OPHE3/00916
June 17, 2013

TO: Eke Place/Kulina Street Residents

SUBJECT: ENVIRONMENTAL TREATABILITY STUDY OF TETRACHLOROETHYLENE AT
THE FORMER AIEA LAUNDRY FACILITY

Naval Facilities Engineering Command (NAVFAC) Hawaii and Joint Base Pearl Harbor-Hickam would like to invite Eke Place/Kulina Street residents to an **Open House Meeting on Tuesday, June 25, 2013, from 6:30 p.m. - 8:30 p.m. at the Aiea High School Cafeteria**. Multiple information displays explaining upcoming work at the Former Aiea Laundry Facility environmental cleanup site will be shown, and each display will have Navy and project representatives to explain and answer questions. The Former Aiea Laundry Facility site is located on the corner of Moanalua Road and Kaimakani Street and includes the parking lot for St Elizabeth's Church and the adjacent grass covered vacant lot.

Site Background:

The Navy Fleet Training Center operated on the site from the 1940s to the 1990s and included a laundry facility. During this time, **chlorinated volatile organic compounds (CVOCs)**, primarily **tetrachloroethylene (PCE)**, were released to the ground during routine storage and use of dry cleaning compounds. Environmental investigations and remedial activities have been on-going at the site since 1989 to take corrective action for this issue.

The Navy focused initial investigations on the current parking lot area because the former laundry buildings were located there and it was suspected of containing the highest amount of contamination. As a result, contaminated soil, a six-inch drain line, and five underground storage tanks and associated piping were removed in 1993 from the current parking lot area. Additionally, a Soil Vapor Extraction System (SVE) was installed in 1996 to reduce remaining contamination in the soil and groundwater and to prevent the volatile contaminants from moving off-site toward the adjacent church property. The system was operated periodically from October 1996 to March 2007. **Early air monitoring in 1993 and several rounds of additional investigation indicate soil vapor is not adversely affecting the Saint Elizabeth Church and School property.**

An additional area of contamination was recently identified toward the back of the grass covered vacant lot. This area was not rigorously investigated in the past for PCE because it was not located near buildings which historically used or stored PCE. Two soil vapor sampling events have been taken along the fenceline of the property near the newly identified area. **Results indicate the contamination**

from the vacant lot has not moved off-site. The Navy is working on an upcoming Treatability Study to determine if a new SVE is the appropriate action to take to reduce contamination and to continue to prevent off-site migration from both the area of the original underground storage tanks and the grassy vacant lot area.

Upcoming Site Work:

Plans are to start by replacing the existing SVE unit (located in the Church parking lot) in July 2013. A new, more efficient SVE will be installed and a second treatment unit will be added in the grass covered vacant lot referred to as the "backyard area." The Navy is currently working on the site adding more extraction wells and checking the existing piping and extraction wells that will be reused. The treatability study will run for approximately one year. During that time, residents may see vehicles and personnel on the Navy property conducting sampling and drilling new extraction wells. Work areas will be cordoned off with safety cones and/or fencing to protect people from potential hazards associated with the work being done.

Field activities will be conducted between 8 a.m. and 4 p.m., Monday through Friday; however the SVEs may be operated initially 24-hours each day. Residents may hear periodic noise in the vicinity of the SVE although it should not be loud. Steps will be taken to prevent excessive noise at the Navy's property line. Appropriate safeguards will be used around the SVEs to prevent potential trips, falls and injury associated with equipment being used. Parents are urged to exercise caution and keep children away from any equipment.

Upon completion of the study, any areas that have readings higher than the project action levels may require additional treatment. Sampling off Navy property in the area of residences is not anticipated at this time.

We appreciate your patience while testing is conducted in your neighborhood and will continue to work with base leadership to keep residents informed of work schedules. If you have additional questions, please contact Joel Narusawa, NAVFAC Hawaii Remedial Project Manager, at (808) 471-1171, extension 222 or joel.narusawa@navy.mil.

Sincerely,

APPENDIX B

Examples of Open House Posters

- B.1: Aiea Laundry posters to share information with private residents
- B.2: Naval Weapons Industrial Reserve Plant Bethpage posters to share information with private residents

Aiea Laundry Site

Historical Use

Aiea Laundry Site, an area used from the 1940s until the 1990s as a Navy operated laundry site and as a Fleet Training Center. By 1998, all buildings had been demolished.

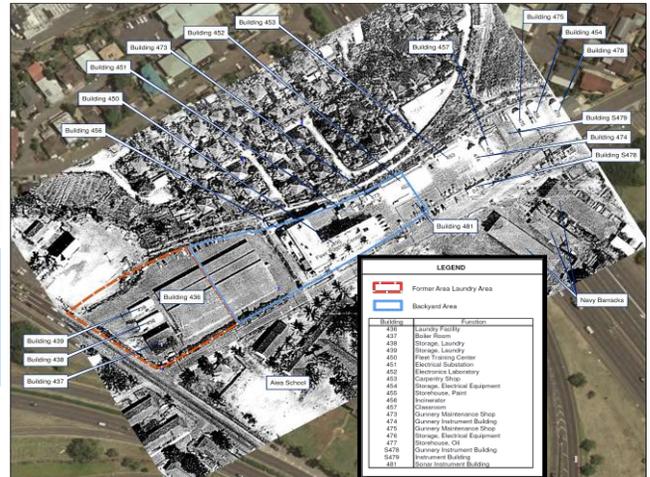
Former Laundry Area

- Included Buildings 436 and 439 used for laundry and dry-cleaning
- Currently leased to the Saint Elizabeth's Church and School as a parking lot

Backyard Area

- Included former Fleet Training Center building (#450) and associated buildings
- Currently a grass-covered vacant lot

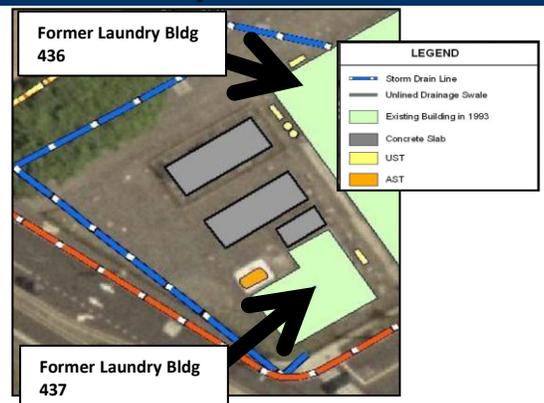
Chlorinated volatile organic compounds (CVOCs), primarily **tetrachloroethylene (PCE)**, were released to the environment during historical dry cleaning operations.



Environmental Investigations and Cleanup

Multiple investigations and environmental cleanup activities have been ongoing since 1989.

- Primary sources of contamination include four **Underground Storage Tanks (USTs)** adjacent to the former Laundry buildings which stored dry-cleaning solvents.
- The USTs and piping and contaminated soil down to 10 feet deep were removed in 1993 and all excavated areas were lined with plastic sheeting and backfilled with clean gravel.
- A **Soil Vapor Extraction System (SVES)** was installed in the current St. Elizabeth Church Parking Lot in 1996 and operated until 2007 to remove CVOc contamination and keep it from migrating off-site in the soil vapor (air between soil particles).



Soil vapor concentrations have significantly decreased since 1996, and current levels continue to be safe for people at the neighboring properties.

A new area of contamination was confirmed in the Backyard Area in 2011.

- The Backyard Area did not have buildings or tanks which historically used or stored PCE. However there was note of disposal of dry cleaning filter in the backyard.
- Initial investigation of the Backyard Area conducted in 1996 found an isolated area with 1 soil sample with elevated PCE concentrations that was relatively low compared to the Laundry Area. Immediate action was not identified. Site work focused on the former Laundry Area.
- Additional sampling was conducted in 2011 to confirm there were no areas of PCE contamination requiring action, and the new area was identified.
- Two events of soil vapor sampling were recently taken along the fenceline of the property near the newly identified area.



Sampling results indicate PCE has not moved off-site in the soil vapor in the Backyard Area.

Remaining Environmental Concerns

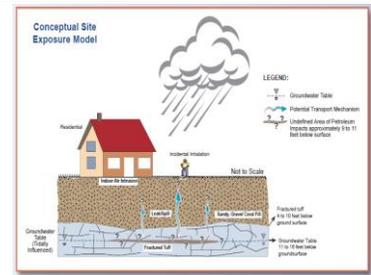
- PCE and other CVOCs remain in the soil in the Former Laundry Area and in the Backyard Area.
- Elevated PCE concentrations remain in the soil vapor at the Former Aiea Laundry Facility and in the Backyard Area.
- There is the potential for migration of soil vapor from the Former Aiea Laundry Facility and Backyard Area to the neighboring properties.

The U.S. Environmental Protection Agency, State of Hawaii Department of Health, and Navy agreed to conduct a Treatability Study to evaluate a new SVE/Soil Vapor Migration Control (SVMC) system to address these concerns.

Soil Vapor

Vapor Intrusion (VI)

- Because CVOCs evaporate easily, there is the potential for them to move out of soil or groundwater and into overlying buildings in a process known as **Vapor Intrusion (VI)**.
- Over time, CVOCs present underground in soil or groundwater can evaporate and move into soil vapor.
- **Soil vapor** is the air found in the spaces between soil particles. Soil vapor can move or migrate underground.
- Elevated levels of CVOCs in soil vapor that migrate into indoor air can pose a VI concern if it occurs at high enough concentrations.



Vapor Intrusion may occur when vapors from contaminated groundwater or soil evaporate and then seep up through the soil and enter buildings through cracks and holes in foundations or slabs of buildings.

St. Elizabeth Church and School VI Investigations

- **Sub-slab soil vapor** samples were taken from directly beneath the church and school buildings. These are the best indicator of the potential for VI to occur. If CVOCs are not present in the sub-slab soil vapor at sufficient concentrations, then VI will likely not occur.
- **Indoor Air samples** were taken to confirm VI is not occurring in the church or school building and to confirm indoor air quality.
- **Outdoor Air samples** were taken to show the background air quality because CVOCs are often present in the outdoor air from other sources and can impact the in the indoor air.



Results indicate vapor intrusion is currently not a concern in the St. Elizabeth Church and School and the air on the property poses no unacceptable risks to adults or children.

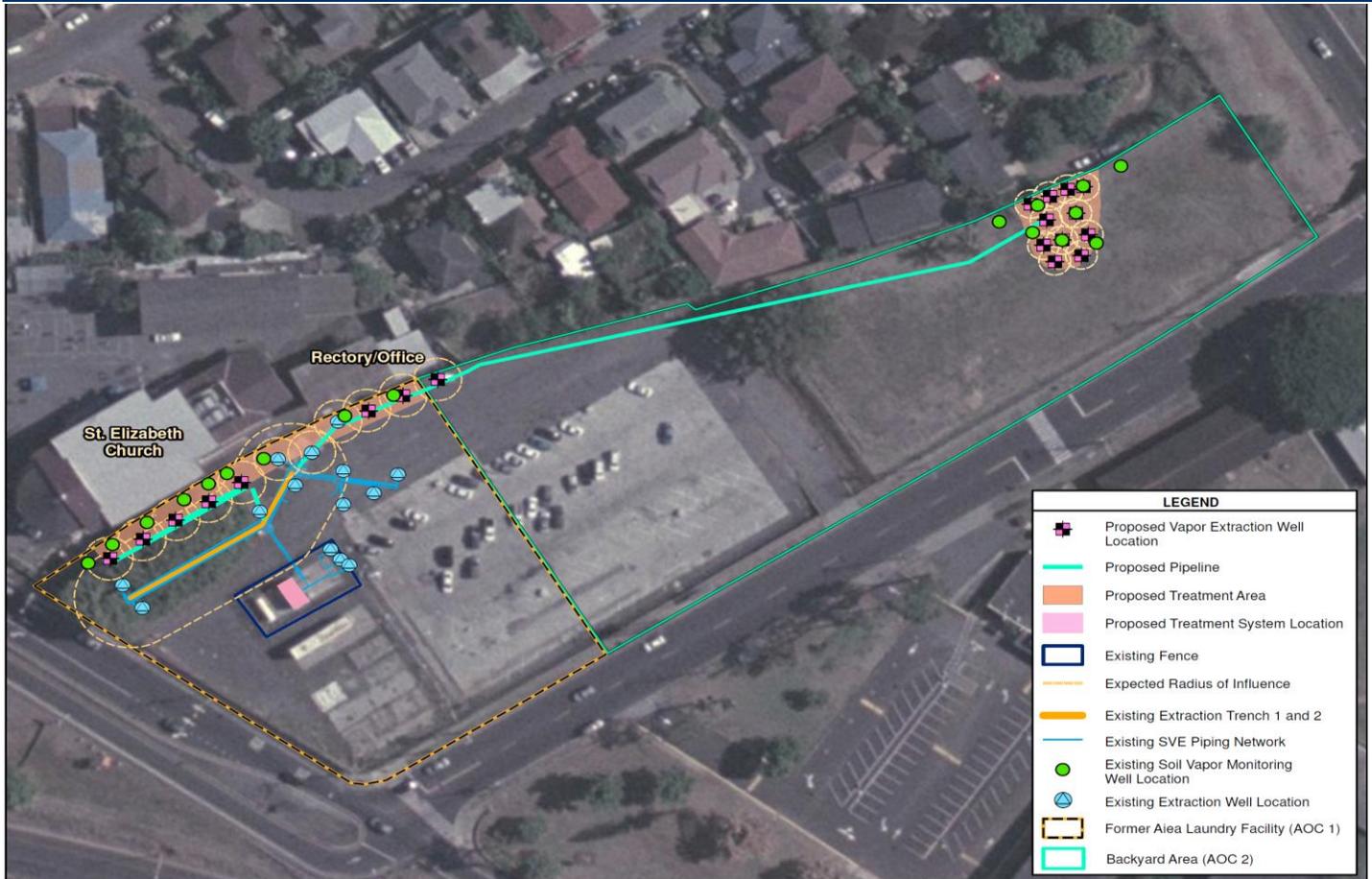
Current Soil Vapor Extraction System (SVES)

- The **SVES** uses a system of piping to inject contaminant free air into the ground which causes the CVOCs to evaporate out of the soil into the soil vapor.
- A series of underground **extraction wells** are placed under vacuum to pull CVOCs out of the soil vapor.
- Extraction wells were installed near the site of the Former Laundry buildings and tanks.
- Probes were placed in **Soil Vapor Monitoring (SVM) Wells** along the fenceline to monitor the CVOC levels that could potentially migrate off site.
- A **treatment unit** was constructed in 1996 in the current parking lot area to collect and treat the extracted vapors.



Treatability Study

New Soil Vapor Extraction System



Treatability Study will begin in July 2013 and run approximately 1 year

- Replace the existing SVE unit, installed in 1996, with a more efficient system. The system will include a small treatment unit in the Backyard Area and the primary treatment unit near the Former Laundry Area.
- Other field work will include:
 - Installing additional soil vapor extraction wells along the fenceline of the church property and in the Backyard Area.
 - Installing new pipeline connecting the extraction wells to the treatment units.
- Collect soil vapor samples for a year to evaluate the effectiveness of the new system and determine any future action.

Upcoming Field Work

- Residents may see vehicles and personnel on the Navy property conducting sampling and drilling new extraction wells.
- Field work will be conducted between 8 a.m. and 4 p.m. Monday through Friday; however the SVES may be operated initially 24 hours per day
- Residents may hear periodic noise near the SVE unit in the parking lot and from blowers in the Backyard Area, but it should not be loud
- Steps will be taken to prevent dust and excessive noise at the property line.

There is no imminent danger to residents from the contaminated soil and soil vapor, however residents should avoid work areas that are cordoned off with safety cones to prevent accidental slips/trips/falls.

Questions During Field Work

Please contact: **Joel Narusawa**, NAVFAC Hawaii Remedial Project Manager,
808-471-1171, extension 222 or joel.narusawa@navy.mil.

SITE HISTORY



The primary mission of the Naval Weapons Industrial Reserve Plant (NWIRP) was to research, design, build and test military aircraft in support of our national defense

1942

Naval Weapons Industrial Reserve Plant (NWIRP) opens as part of Grumman "Iron Works"

1940's – 1980's

Site 1 used to store waste solvents

1986

Initial studies identify sites on NWIRP that require further investigation - environmental restoration program begins

1995

Operable Unit One Record of Decision (ROD)

1998

NWIRP closes – Soil Vapor Extraction (SVE) system installed at NWIRP Site 1 - operates until 2002 when groundwater concentrations are reduced to cleanup goals

2001

Operable Unit Two off-site groundwater ROD

2007

Work plans prepared and approved by NYSDEC for soil vapor sampling at NWIRP fence line

2009

Homes along 11th Street sampled to determine potential for vapor intrusion (January) - Results indicate several homes on 11th street have TCE in indoor basement air that exceeds NYSDOH guidelines - Navy conducts testing of additional homes on 10th/11th Streets and Sycamore/Maple Avenues, and installs air purification units in residences

2006

NYSDOH issues guidance for evaluating potential vapor intrusion at restoration sites (October)

2008

Navy conducts soil vapor sampling at NWIRP fence line and finds elevated levels of TCE in SE corner of property (January) - Additional soil vapor sampling along 11th street finds elevated levels of TCE - residents contacted to arrange for indoor air sampling (October – December)

Present

Navy works with Agencies to implement immediate corrective action, reduce source of vapor and ensure protection of Bethpage residents



SITE 1: FORMER DRUM MARSHALLING AREA & SOIL VAPOR SAMPLING LOCATIONS



Locations of On-site/Off-site Soil Vapor Samples

Site 1 - Former Drum Marshalling Area:

Approximately 4 acre site used from the 1940's through the 1970's to store drums of waste materials - volatile chemicals historically used at the site were released to soil and groundwater;

1998 – 2002: Ran soil vapor extraction system on Site 1 of Plant 3 that removed most of the on-site VOCs;

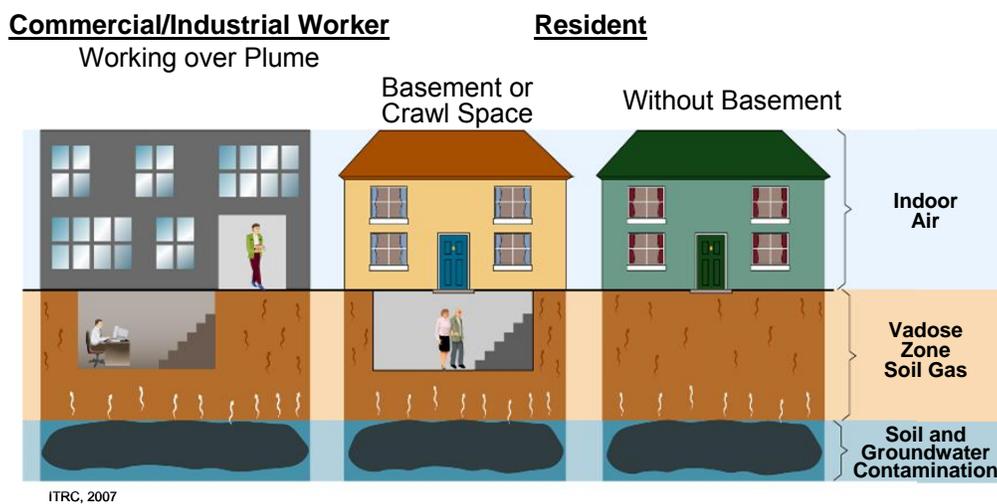
Sampling conducted in January 2009 indicates volatile chemicals have moved off-site. Trichloroethylene (TCE) in indoor basement air in several 11th Street homes found to exceed NYSDOH guidelines;

Navy is coordinating with New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH) and Nassau County Department of Health (the Agencies) to implement appropriate actions to immediately reduce TCE levels in indoor air and permanently reduce the source of the vapor intrusion to ensure protection of Bethpage residents.



UNDERSTANDING VAPOR INTRUSION

- Vapor intrusion is the process by which volatile chemicals move from an underground source into the indoor air of buildings or other enclosed structures.
- Soil vapor sampling results along 11th Street indicate that volatile chemicals have moved off-site in limited areas from NWIRP property.
- Several homes on 11th Street have levels of trichloroethylene (TCE) in indoor basement air that are higher than NYSDOH guidelines.



Volatile chemicals are chemicals that can evaporate easily. Vapor intrusion should be investigated wherever volatile chemicals have been historically released at a site and site conditions indicate it may have the potential to occur.

The NYSDOH guideline was set many times lower than the levels that have caused health effects. The Navy is working with the Agencies to determine the most effective way to:

- immediately reduce vapor levels in affected homes, and
- permanently reduce the source of vapors to ensure long-term protection of Bethpage residents.



SUMMARY OF RECENT ACTIONS

Significant progress has been made in the environmental investigation of Site 1 at NWIRP. Recent actions completed include:

Installation of Air Sparging/Soil Vapor Extraction (AS/SVE) System: A treatment system was installed at Site 1 to remove volatile chemicals in soil and groundwater using “air sparging/soil vapor extraction”. The treatment system:

- was designed to eliminate the continuing source of groundwater contamination;
- was successful in removing over 2 tons of volatile chemicals during operation Aug 1998 - Mar 2002;
- achieved the goal of reducing volatile chemicals in both soil and groundwater on site.



Air sparging uses air to help remove chemical vapors from both soil and groundwater. The soil vapor extraction system then works like a vacuum to extract and collect the volatile chemicals for proper disposal. AS/SVE systems work best on volatile chemicals, like those found at NWIRP, Site 1 - Former Drum Marshalling Area.



Soil gas sampling on the NWIRP eastern border in January 2008. Sampling indicated elevated levels of volatile chemicals at the facility boundary.

Environmental Sampling Conducted Along The Eastern Boundary of NWIRP: After developing a sampling plan and coordinating with NYSDEC, the Navy conducts soil vapor sampling along the facility fence line in January 2008. Results indicate that elevated levels of volatile chemicals are present along the eastern edge of the facility.

Environmental Sampling Conducted In 11th Street Homes and Neighborhood Right-of-Ways: Sampling conducted in October 2008 along right-of-ways indicates elevated levels of TCE in soil vapor along 11th Street. Preliminary results from additional sampling conducted in January 2009 indicates elevated TCE levels in the indoor basement air of several residences on 11th Street. Navy contacts residents and installs carbon filter units as an immediate mitigation measure.



Indoor air sampling was conducted in January 2009 in homes along 11th Street. Results indicate elevated levels of TCE in the indoor basement air of several of the homes sampled.



ONGOING & PLANNED FUTURE ACTIONS

- The Navy will continue to coordinate with NYSDEC, in consultation with NYSDOH and Nassau County Department of Health (the Agencies) to:
 - determine the most effective measures to quickly reduce the vapor levels in affected homes; and
 - permanently reduce the source of vapors to ensure the protection of Bethpage residents.
- Ongoing and planned future actions include:
 - Additional Environmental Sampling: Because of elevated levels found in some homes along 11th Street, the Navy is conducting additional indoor air and sub-slab sampling in homes along 10th Street and Sycamore and Maple Avenues.
 - Sealing Openings in Basement Floors: Any utility access or large cracks in basement floors will be sealed temporary to minimize potential for vapor intrusion.
 - Installation of Portable Air Filtration Units: Portable carbon air filtration units have been installed in affected homes to reduce levels of TCE immediately. Testing will be conducted to ensure effectiveness.
 - Installation of Sub-slab Depressurization Systems: Sub-slab depressurization systems (similar to those proven to effectively remove radon) will be offered for homes where levels of volatile chemicals exceed NYSDOH guidelines. Pending approval from residents, installation and monitoring of these systems will be conducted over the coming months.
 - Installation of a Soil Vapor Extraction (SVE) System: The SVE system will be installed on NWIRP property and will be designed to draw vapors back to Navy property, reduce the source of vapors and prevent any further migration into nearby neighborhood (pilot test performed in January 2009 and full scale construction expected to begin in Sept 2009).



A sub-slab depressurization system is an effective, proven way to keep chemical vapors from entering the indoor air of homes.

APPENDIX C

FAQs

- C.1: Generic FAQs and Answers
- C.2: Potential FAQs requiring site specific answers

Vapor Intrusion Investigations Generic Frequently Asked Questions (FAQs) and Answers

What is Vapor Intrusion?

Vapor intrusion occurs when volatile organic compounds (VOCs) evaporate out of contaminated soil and/or groundwater and move into the air in overlying buildings. In recent years, the Environmental Protection Agency (EPA) has required that vapor intrusion be investigated where soil or groundwater contaminated with VOCs lies near occupied buildings.

What are VOCs?

VOCs, or Volatile Organic Compounds, are a group of chemicals which evaporate easily into the air at room temperature. VOCs are emitted by a wide variety of household and industrial products numbering in the thousands.

What products contain VOCs?

Some examples of products containing VOCs include: paints and lacquers, paint strippers, cleaning supplies, pesticides, gasoline and other fuels, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions. VOCs are also present in cigarette smoke and motor vehicle exhaust. Common sources of VOCs found at environmental cleanup sites include gasoline and other petroleum compounds, dry-cleaning chemicals, and industrial solvents used for degreasing.

Can I get sick from breathing VOCs?

Having VOCs in your air does not mean adverse health effects will occur. Virtually everyone is exposed to VOCs on a regular basis. Whether or not adverse effects will occur depends on a variety of factors including which VOC you are exposed to (some are much more likely to cause health effects than others), how much you are exposed to, how long and how often the exposure occurs, and your personal sensitivity to the specific chemical. Environmental cleanup guidelines are set at very low levels to protect even the most sensitive people from potential future health effects.

Why not start with taking indoor air samples to see if VI is occurring – or – why aren't you taking indoor air samples?

VI studies typically do not rely solely on indoor air sampling because VOCs found in indoor air usually do not all come from VI. Many materials and substances commonly found in homes and businesses contain VOCs that may be detected by indoor air testing. Even VOCs from motor vehicle emissions and other outdoor sources can contaminate indoor air. When VOCs from these types of sources are detected during indoor air sampling, they are referred to as background contamination because the chemicals are not present as a result of VI from the soil or groundwater contamination. Air samples taken from directly beneath the foundation of a building (sub-slab samples) show what can be entering the building from contaminated soil or groundwater and indicate if there could be a potential vapor intrusion problem. Indoor air

samples are used to measure indoor air quality. If sub-slab results do not indicate a potential VI concern, then indoor air sampling may not be necessary. Outdoor air samples may also be taken as comparison to show the typical “background” concentrations in the area.

What is a soil gas (or soil vapor) sample?

Soil gas is the air found in the spaces between soil particles. Over time, VOCs present underground in soil or groundwater can evaporate and move into soil gas. Samples of soil gas taken from directly beneath a building’s foundation show what is available to enter the building through VI. The results indicate if there could be a potential VI concern. VI will likely not occur if there are not sufficient levels of VOCs in the sub-slab soil gas samples.

How does a Vapor Intrusion Mitigation System (VIMS) work?

The **VIMS** operates by using a system of fans to create a vacuum beneath the building which reduces the air pressure. Vapors will naturally flow from an area of higher pressure to an area of lower pressure. Normal heating, air-conditioning and ventilation systems can decrease pressure inside buildings, which will draw soil vapors from the ground into overlying buildings. When the VIMS is operational, vapors are essentially trapped below the building in the lower pressure area created by the VIMS vacuum and are unable to move upward into overlying buildings.

How does a soil vapor extraction system (SVES) work?

The **SVES** uses a system of piping to inject contaminant free air into the ground which causes VOCs to evaporate out of contaminated soil and/or groundwater into the soil vapor. A series of underground extraction wells are placed under vacuum to pull VOCs out of the soil vapor and into a treatment unit.

Vapor Intrusion Investigations FAQs Requiring Site Specific Input

1. If the environmental cleanup program has been ongoing for years, then why did you wait so long to look at Vapor Intrusion in my building/home?
2. Can't you just look at the air samples taken routinely over the years in this building by the Industrial Hygienists to see if VI has occurred?
3. If there are VOCs nearby, then how do we know it hasn't moved under our building/under our homes/onto our property in the past?
4. Will you sample my office/my building/my property/inside my home if I request it?
5. Are there plans to sample the air inside the buildings?
6. What are you going to do to protect me/my health?
7. What are you going to do to fix the problem?
8. Should I see my doctor?
9. Will the DON pay for my doctor visit/test/bills?
10. Is there a medical test that will show if I have been exposed or have a health problem from the VOCs under/in/around my building?
11. Will this contamination affect my property value?
12. If you find the contamination has moved onto my property will the government compensate me for the damage to my property?
13. Does the treatment system or blowers give off exhaust that could contain VOCs?
14. When you dig the wells or trenches are you releasing vapors into our air? Is it safe?
15. What about the groundwater – is it contaminated? Are you going to clean it up?
16. If you know there is contamination still in the soil, why don't you just dig it up and remove it?
17. How will you know if the Vapor Intrusion Mitigation System /Soil Vapor Extraction System is working?

18. Could vapor intrusion be occurring in our buildings/homes while you are conducting the investigation? Is there something that can be done to prevent it while the investigation is conducted?
19. I'm not comfortable with the potential exposure. Can my office/workplace/family be relocated?
20. Are you sure this is a safe area for workers/housing?
21. How long could VI have been occurring in this building?
22. Have I been/could I have been exposed to unsafe levels of VOCs in the past?
23. Can I have the potential exposure documented in my medical record?
24. Is this the next "asbestos"?
25. Will the DON help me identify my indoor air sources of VOCs and help me dispose of them?