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INSTALLATION RESTORATION PROGRAM

Site 12
Exchange Laundry Disposal Area
Remediation Alternatives

NAVAL AMPHIBIOUS BASE, LITTLE CREEK

INTRODUCTION

The Installation Restoration (IR) Program is an ongoing Department of Defense program conducted at military bases nationwide to identify and address potential human health and environmental impacts as the result of past waste disposal practices. This fact sheet is one in a series, informing interested citizens about the environmental investigations and cleanup actions being conducted under the IR Program at the Naval Amphibious Base (NAB) Little Creek.

This fact sheet is a guide to the remediation alternatives being considered for implementation at Site 12, the Exchange Laundry Disposal Area. Even though remediation is being evaluated for the site, it does not pose an immediate threat to human health or the environment.

SITE 12 PROFILE

The former Exchange Laundry/Dry Cleaning Facility was located to the south of the current Commissary (Building 3445), near the intersection of 3rd and B streets. A storm drain to the north of the old building received dry cleaning wastes including Tetrachloroethene sludge, sizing, soap and dye. The storm line drained into a canal that flows from Lake Bradford to Little Creek Cove. The remains of the storm line were removed for construction of the new Commissary. The site consists of any areas in the vicinity of the former sewer line where contamination still remains.

REMEDIATION ALTERNATIVES

Two chemical characteristics of Tetrachloroethene (also Perchloroethylene, PCE) allow the consideration of a range of remediation alternatives in the general categories of air stripping and bioremediation.

AIR STRIPPING

PCE is a volatile organic compound (VOC), which means it readily evaporates when exposed to air. Therefore, PCE can be separated, or stripped, from water if air is bubbled through the contaminated water. The air is then collected and treated. The collected water may also need treatment before discharging or disposal. An Innovative Treatment Technology (ITT), In Well Aeration, completes the stripping action in the well. This avoids pumping water out of the ground, so no further treatment or disposal is necessary.

BIOREMEDIATION

PCE is also a highly oxidized chlorinated solvent. Under the proper biological and chemical conditions, PCE can ultimately be reduced to harmless carbon dioxide, oxygen, and chlorine ions. Bioremediation can be used in several ways. Contaminated groundwater can be pumped to the surface for ex situ treatment in bioreactors, or nutrients can be added to the subsurface to improve in situ reduction of contaminants by microorganisms. If conditions in the subsurface are sufficient for the degradation to occur, nutrient addition may not be necessary and only groundwater monitoring may be required. This latter form of bioremediation is called natural attenuation. Its advantage is that above-ground treatment of groundwater and reliance on equipment to deliver nutrients to the subsurface is not necessary, therefore it can be significantly cheaper. Bioremediation is also an ITT.

ALTERNATIVES EVALUATION

Investigations of Site 12 have indicated that Air Stripping/In Well Aeration and Bioremediation/Natural Attenuation should be evaluated for the site. NAB Little Creek is dedicated to addressing environmental impacts due to past waste disposal practices. That dedication may require the use of innovative, or unproven technologies for remediation alternatives. This is necessary because conventional "pump and treat" methods for cleaning groundwater generally are not successful. In 1994 the National Research Council of the National Academy of Sciences found that only eight of 77 pump and treat systems reviewed had achieved remediation goals. EPA has recognized that it is often "Technically Impracticable" to pump and treat chlorinated solvents. A detailed Feasibility Study (FS) which fully evaluates established and innovative remediation alternatives for the site will be completed. The public will have the opportunity to comment on the report when it is completed.
The following information describes innovative technologies and bioremediation in more detail.

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INNOVATIVE TREATMENT TECHNOLOGIES

Treatment Technologies are chemical, biological or physical processes applied to hazardous waste or contaminated materials to permanently change their condition. Treatment Technologies destroy contaminants or change them so that they are no longer hazardous or, at least, are less hazardous. Innovative Treatment Technologies (ITT) are newly invented processes that have been tested and used as treatments for hazardous waste or other contaminated materials, but still lack enough information about their cost and how well they work to predict their performance under a variety of operating conditions. The Environmental Protection Agency (EPA) encourages selection of ITTs because they may offer better, cost-effective, long-term, and efficient solutions to hazardous waste clean-up problems; provide alternatives to land disposal or incineration; and are often more acceptable to surrounding communities than some established treatment technologies (for example, incineration).

As knowledge about the cleanup of contaminated sites increases, new methods for more effective, permanent cleanups will become available. ITTs, which lack a long history of full-scale use, do not have the extensive documentation necessary to make them a standard choice in the engineering/scientific community. However, many ITTs have been used successfully despite incomplete verification.

Developing and perfecting ITTs is an on-going process. It begins with a concept - an idea of how to treat a particular hazardous waste. The concept usually undergoes research and evaluation to prove its feasibility. The next step is bench-scale testing where a small version of the technology is built and tested in a laboratory. The technology is then demonstrated at small-scale levels at field sites, proceeding to full-scale use at field sites. As the technology is used and evaluated, it is continuously improved. Only after a technology has been used at many different types of sites and the results fully documented, is it considered an established technology. The majority of technologies in use today are still classified as innovative.

BIOREMEDIATION

Bioremediation is a process that uses naturally occurring microorganisms (yeast, fungi, or bacteria) to break down, or degrade, contaminants. Microorganisms, just like humans, eat and digest organic substances for nutrients and energy. Certain microorganisms can digest fuels or solvents that are hazardous to humans. Microorganisms must be active and healthy in order for bioremediation to take place. Some bioremediation technologies assist microorganisms' growth and increase microbial populations by creating optimum environmental conditions for them to detoxify the maximum amount of contaminants.

Indigenous microorganisms are those that are found already living at a given site. To stimulate the growth of these indigenous microorganisms, the proper soil temperature, oxygen, and nutrient content may need to be provided. If the organisms needed to degrade a particular contaminant are not present in the soil at the site, exogenous microorganisms from another site, whose effectiveness has been tested, can be added to the soil. Bioremediation can be used to treat soil and/or groundwater and occurs under aerobic (in the presence of atmospheric oxygen) and anaerobic (in the absence of atmospheric oxygen) conditions. Sometimes during aerobic and anaerobic degradation of the contaminants, intermediate products that are less, equally, or more toxic than the original contaminants are created.

Bioremediation is useful for many types of organic wastes and is a cost-effective, natural process. Many techniques can be conducted on-site, eliminating the need to transport hazardous materials. The extent of bioremediation is highly dependent on the toxicity and initial concentrations of the contaminants, their biodegradability, the properties of the contaminated soil, and the particular treatment system selected.

See the IR Program's Fact Sheets on In Well Aeration and Natural Attenuation for more information on these specific remediation alternatives being considered for treatment at Site 12.

References:
1. A Citizen's Guide to Innovative Treatment Technologies, EPA 542-F-96-001
2. A Citizen's Guide to Bioremediation, EPA 542-F-96-007

CONTACT FOR MORE INFORMATION

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INFORMATION REPOSITORIES

Information Repositories contain all documents and information pertaining to the IR Program and are available for the public to review. The four repositories are at:

☞NAB Little Creek Library
Building 3004/ 8th St.
464-7691

☞Little Creek Library
7853 Tarpon Place
Norfolk, VA 23518
441-1751

☞Bayside Area Library
936 Independence Blvd.
VA Beach, VA 23455
460-7518

☞Central Library
4100 Virginia Beach Blvd
VA Beach, VA 23452
431-3100