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PROPOSED PLAN FOR REMEDIAL ACTION AT OPERABLE UNIT 7 (OU 7) SITE 16 AIRCRAFT INTERMEDIATE MAINTENANCE DEPARTMENT SEEPAGE PIT NAS CECIL FIELD FL

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Proposed Plan for Remedial Action
Naval Air Station Cecil Field
Operable Unit 7, AIMD Seepage Pit (Site 16)

Jacksonville, Florida — March 1996

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Terms that appear in *italics* within the text are defined in the glossary.

Public Meeting

Date: March 21, 1996

Time: 7:00 to 9:00 p.m.

Place: Eisenhower Room in the Bachelor Officers' Quarters at NAS Cecil Field

1.0 INTRODUCTION

The purpose of this *Proposed Plan* is to facilitate public participation in the selection of the remedial method that will be used to clean up contamination at *Operable Unit* (OU) 7, the Aircraft Intermediate Maintenance Department (AIMD) Seepage Pit, at Naval Air Station (NAS) Cecil Field. The location of OU 7 is presented on Figure 1.

In order to assist the public in understanding and evaluating the remedial alternatives being considered, the following information is presented in this document:

- background information on OU 7 developed through records review and field investigations;
- cleanup methods, or *remedial alternatives*, developed during the *feasibility study* (FS);
- the *preferred alternative* and the rationale for recommending it; and
- the schedule of events for public participation.

The cleanup alternatives discussed in this plan were developed for groundwater at OU 7, and were prepared by the Navy (the lead agency for site activities), the *U.S. Environmental Protection Agency* (USEPA), and the *Florida Department of Environmental Protection* (FDEP), in consultation with the NAS Cecil Field *Restoration Advisory Board* (RAB). The Navy, USEPA, and FDEP will select a remedy for OU 7 after receiving, reviewing, and considering comments from the public.

Public Participation

This Proposed Plan is intended to meet the public participation requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), section 117(a). CERCLA requires that the Navy, as the lead agency, publish a document that describes all of the remedial alternatives being considered for a site and identify the preferred alternative.

Public input is a key element in the decision-making process of selecting a remedy for the site. Community members are encouraged to submit comments on this Proposed Plan during a *public comment*

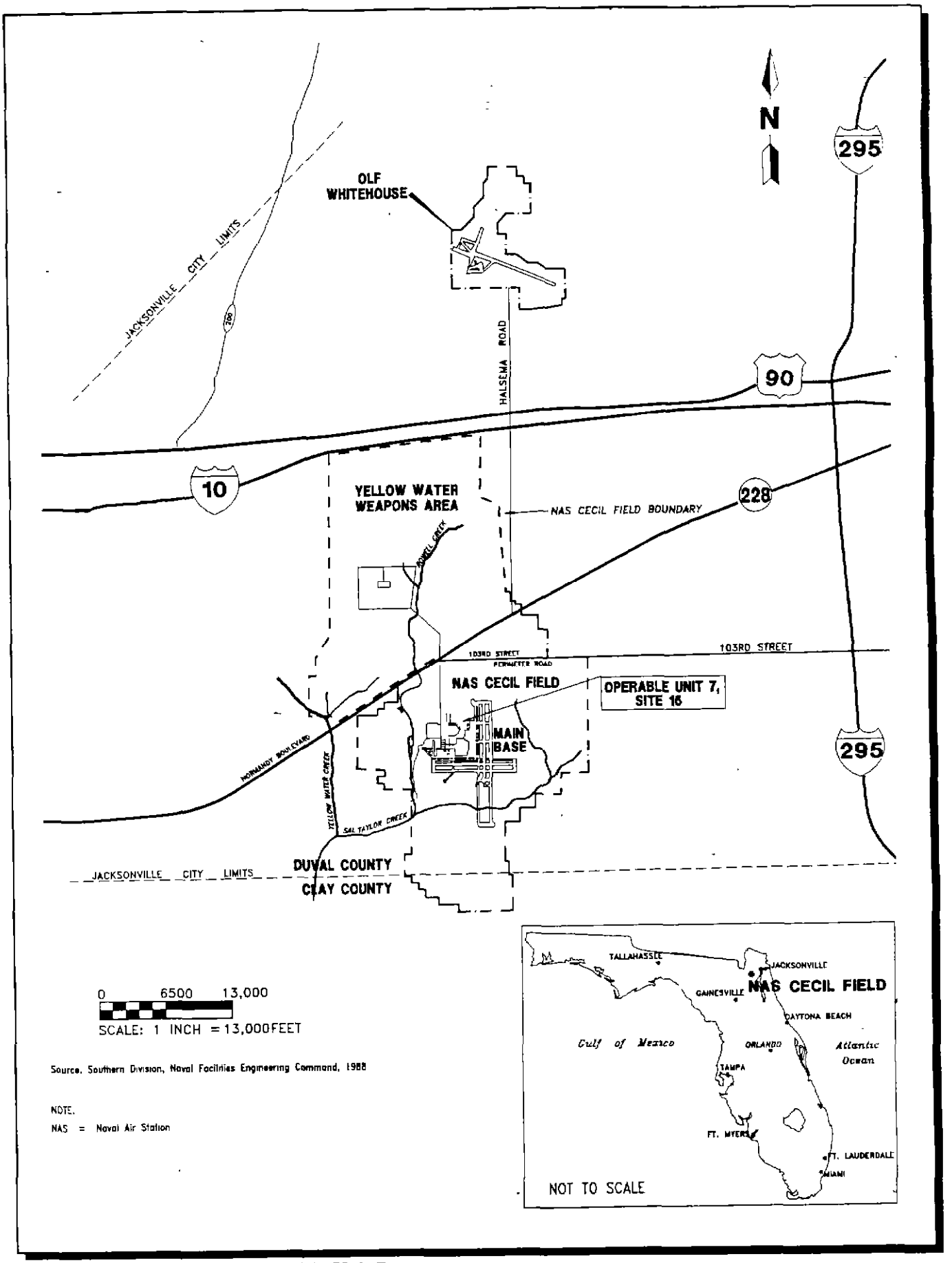


Figure 1. Location of Operable Unit 7

period from March 21 to April 22, 1996. There will also be a public meeting on March 21, 1996, at 7:00 p.m. at the Eisenhower Room in the Bachelor Officers' Quarters at NAS Cecil Field to provide an overview of this Proposed Plan, answer questions, and accept comments.

People are encouraged to attend the public meeting and submit comments or voice any concerns they have regarding this Proposed Plan. The Navy will summarize and respond to the questions and comments received in a *Responsiveness Summary*, which will be included in the *Record of Decision (ROD)* for OU 7.

All available documents pertaining to OU 7, including the Remedial Investigation, Baseline Risk Assessment, Feasibility Study, and this Proposed Plan, will become a part of the public record, and will be placed in the *Information Repository* located at the Charles D. Webb Wesconnett Public Library. The library address and telephone number are presented in Section 6.0.

2.0 SITE BACKGROUND

OU 7, also known as Site 16, the AIMD Seepage Pit, is located 1,600 feet west of the north-south runways in an industrialized area of Cecil Field. When the site was active, it included an underground seepage pit, a holding tank, a bead separator, and associated pipelines. Figure 2 presents these features.

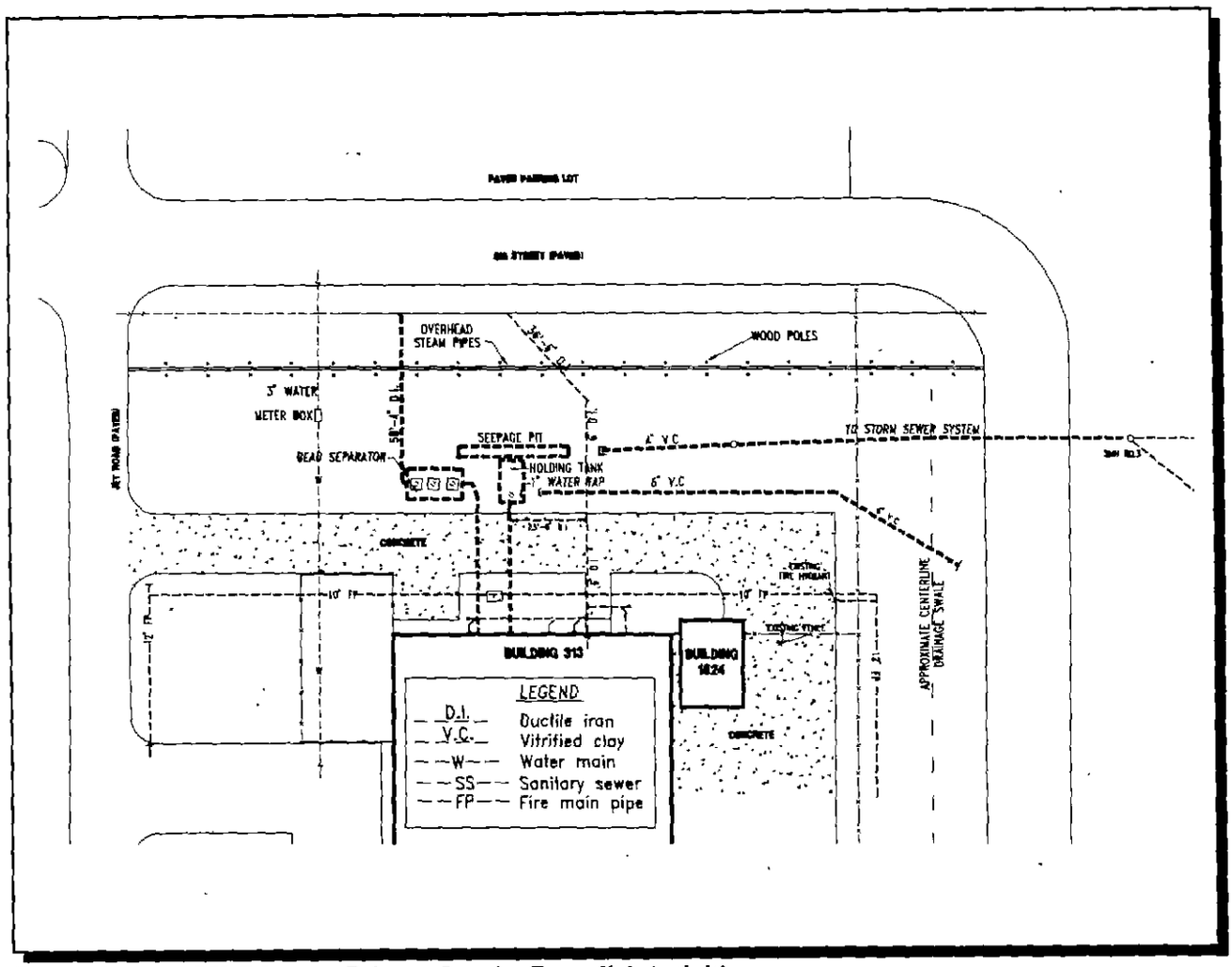


Figure 2. OU 7 Layout Prior to Interim Remedial Activities

From 1959 until 1980, the AIMD, located in Building 313, disposed of grease, rust, scale, solvents, and paint wastes to the holding tank and the seepage pit. Wastes were generated by a machine and engine parts cleaning process. Glass beads and blasting grit from an airframe maintenance process were disposed of into the bead separator. These waste disposal operations resulted in the contamination of soil and groundwater at OU 7.

In March 1993, a modification to the facility's Resource Conservation and Recovery Act (RCRA) *hazardous waste* storage permit stipulated that the holding tank had to be closed. As a result, an *interim remedial action* (IRA) was undertaken in 1994 to remove the seepage pit, holding tank, bead separator, and associated pipes. To remove the source of groundwater contamination, 1,578 tons of soil contaminated with trichloroethylene (TCE), a solvent, were also removed. All IRA activities were completed by June 1994. Figure 3 presents site conditions after the IRA.

Summary of Previous Investigations

Investigation of the AIMD seepage pit and adjacent area at OU 7 began in 1985. The findings of previous investigations are summarized below in chronological order.

Initial Assessment Study (IAS). The IAS was completed in 1985 by Envirodyne Engineers to identify waste sites at NAS Cecil Field warranting further investigation. The study included a review of historical data, as well as site visits and personnel interviews. No sampling activities were conducted. Eighteen sites, including OU 7, were identified by the IAS as requiring further study.

Resource Conservation and Recovery Act Facility Investigation (RFI). The RFI was completed in 1988 by Harding Lawson Associates. *Field investigations* completed for OU 7 included a *geophysical survey*, the installation of three groundwater *monitoring wells*, collection and analysis of groundwater samples, collection and analysis of a single sediment sample, and groundwater-level measurements in all monitoring wells.

The results of the geophysical survey confirmed the location of the holding tank and underground utilities. An unexpected *anomaly*, possibly representing a disturbance to the natural soil or evidence of contaminant migration from the seepage pit into the surrounding soil, was also observed. The results of groundwater analyses indicated the presence of *volatile organic compounds (VOCs)*, including 1,2 trans-dichloroethylene and TCE, and *inorganics*, including lead and chromium. Lead was also detected in the sediment sample. Groundwater-level measurements in the monitoring wells suggested that groundwater flows in a southward direction.

Based upon the results of the RFI, further investigations were planned to assess the lateral and vertical extent of the contamination present at OU 7.

Remedial Investigation (RI) Initial remedial investigation activities were conducted by ABB-ES during fall 1991 and spring 1992 to characterize the nature and extent of contamination at OU 7. The remedial investigation included:

- *a ground-penetrating radar* survey (GPR) to identify areas of excavation, utilities, and other subsurface *anomalies*;
- a detailed profile of subsurface conditions;
- monitoring well installation and collection and laboratory analysis of groundwater samples;
- surface and subsurface soil sampling and chemical analysis;
- evaluation of groundwater flow rate; and
- depth-to-groundwater measurements in monitoring wells.

Laboratory analysis of the OU 7 samples showed volatile and *semivolatile organic compounds*, pesticides, and metals.

Based upon the results of the initial RI, it was determined that more information was needed to completely assess the nature and extent of soil and groundwater contamination at OU 7. To complete

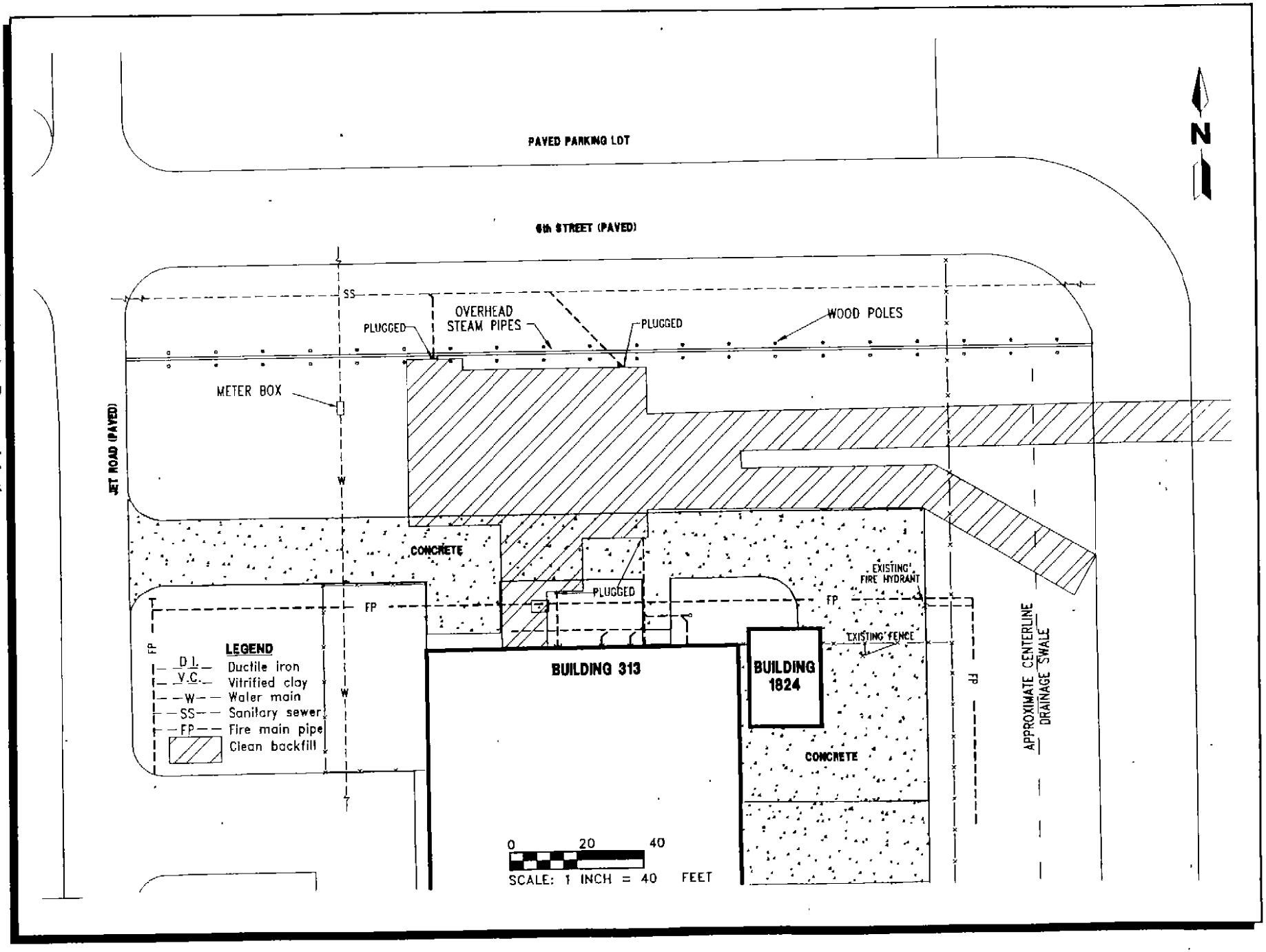


Figure 3. Site Conditions After Interim Removal Action

the assessment of soil and groundwater contamination, an additional field investigation was conducted in 1993 and 1994, and included:

- groundwater screening for VOCs;
- sampling and analyzing surface soil, subsurface soil, *surface water*, and *sediment*;
- installing more monitoring wells and sampling and analyzing groundwater; and
- testing the *aquifer* to determine depth, flow direction, and flow rate of groundwater.

Laboratory analysis of these OU 7 samples again detected volatile and semivolatile organic compounds, pesticides, and metals.

Data generated during the additional RI investigation indicate the presence of residual *dense nonaqueous-phase liquids* in the immediate area of the seepage pit. A conceptual model of the extent of groundwater contamination at OU 7 was prepared and is depicted on Figure 4.

Baseline Risk Assessment (BRA). The BRA is an evaluation of whether or not existing or future exposure to contamination at the site could pose a risk to human health or the environment. For the BRA, the risks presented by the site are estimated with the assumption that no action would be taken to address contamination. This evaluation then serves as a baseline for determining whether or not cleanup of the site is necessary. In the BRA for OU 7, risks for exposure to groundwater, soil, surface water, and sediment were estimated.

The first step in completing the BRA is to identify chemicals of potential concern, which are those chemicals that are present at the site above background conditions and USEPA risk-screening levels and could potentially pose a risk to human health or the environment. Different chemicals are identified as chemicals of potential concern for humans and ecological receptors.

The second step in completing the BRA is to conduct the exposure assessment. In this step, all the ways by which humans and ecological receptors can come into contact with soil, groundwater, surface water, and sediment are considered:

- For humans, under current conditions, the populations that may be exposed to media at OU 7 include adult and child trespassers, adult site workers, and adult maintenance workers. These populations may be exposed to contaminants through direct contact or inhalation.
- For humans, under future conditions, the hypothetical populations that may be exposed include adult and child residents. These populations may be exposed to contaminants through ingestion, direct contact, or inhalation.
- For ecological receptors, the populations that may be exposed to surface water, sediment, and groundwater include terrestrial (land) and aquatic animals.

The third step in completing the BRA is to complete the *toxicity* assessment. At this step in the process, the possible harmful effects of exposure to each chemical of potential concern are evaluated. Generally, contaminants are separated into two groups: carcinogens (contaminants that cause cancer), and noncarcinogens (contaminants that cause adverse effects other than cancer).

The last step in completing the BRA is to conduct the risk characterization. In this step, the results of the exposure and toxicity assessments are combined to estimate the overall risk from exposure to site contamination.

For cancer-causing chemicals, risk is estimated as a probability. For example, a particular exposure to chemicals at a site may present a 1 in 10,000 chance of developing cancer over an estimated lifetime of 70 years. For noncancer-causing chemicals, the dose of a chemical for which a receptor may be exposed is estimated and compared to the reference dose (RfD). The RfD is developed by USEPA scientists and represents an estimate of the amount of a chemical to which a person (including the most sensitive persons) could be exposed over a lifetime, without developing adverse effects. The measure of the likelihood of adverse effects other than cancer occurring in humans is called the hazard index. A hazard index greater than 1 suggests that adverse effects are possible.

For OU 7, risks were not identified for humans being exposed to contaminants in soil, surface water,

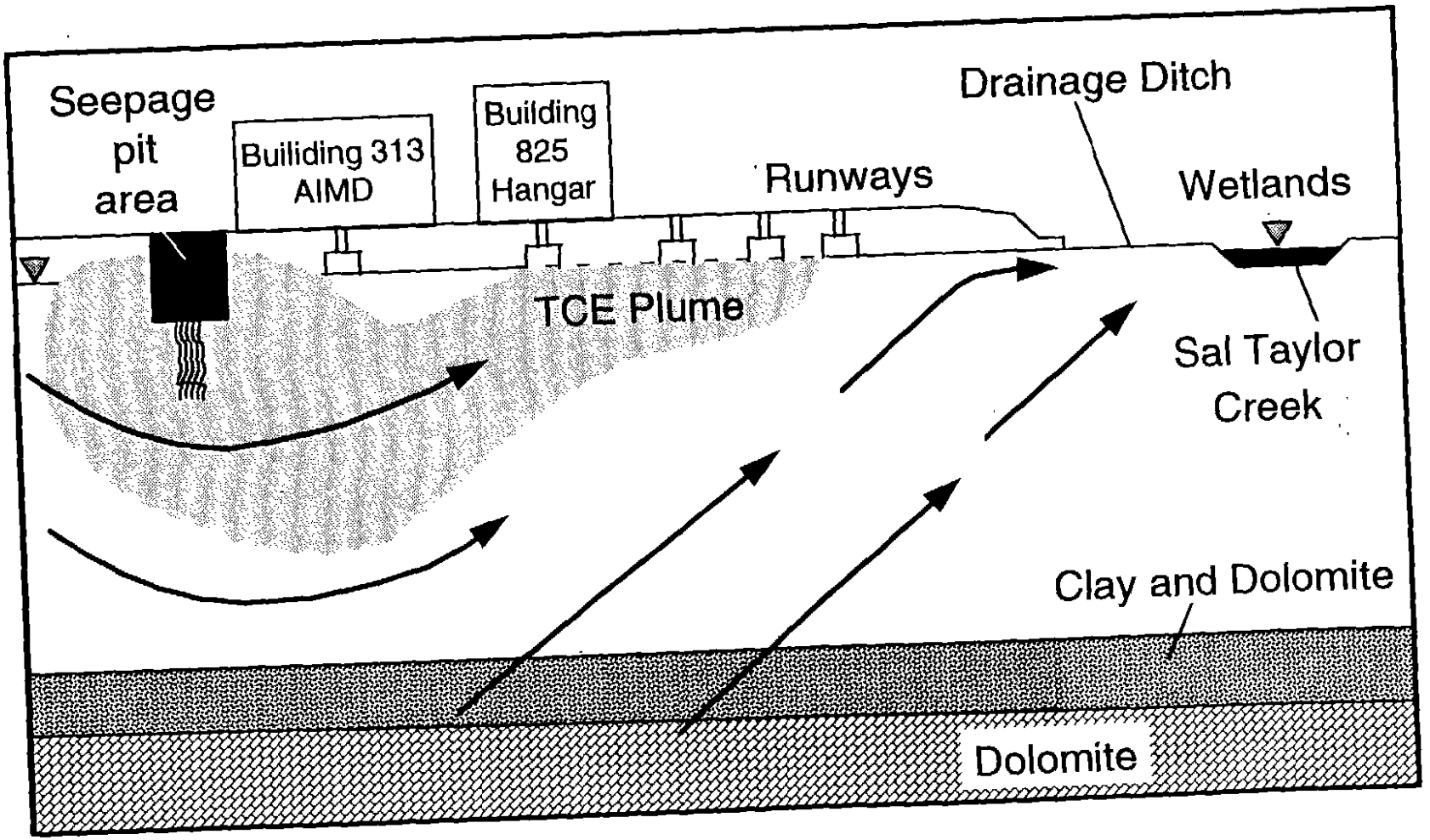


Figure 4. Extent of Groundwater Contamination at Operable Unit 7

or sediment. However, if groundwater at OU 7 were to be used for drinking water, humans would have a 3 in 1,000 chance of developing cancer. The cancer-causing chemicals in the groundwater at OU 7 are trichloroethene (TCE) and 1,1-dichloroethene. Harmful effects other than cancer, including damage to the human nervous system, could be caused by 1,2-dichloroethene, antimony, and thallium in groundwater at OU 7.

For ecological receptors, studies are performed to measure whether or not any adverse effects are occurring. The studies conducted for OU 7 showed adverse effects to small animals living in *wetland* in sediments. However, the contaminants present in the sediment that are contributing to this risk could not be traced to past disposal activities at OU 7.

Feasibility Study (FS). The FS for OU 7 was completed by ABB-ES in August 1995. During the FS, *remedial action objectives* were set and alternatives were developed to meet those objectives.

Remedial Action Objectives

Based on evaluation of site conditions, risks, and legal requirements that may be either *applicable or relevant and appropriate requirements* (ARARs), the following remedial action objective was identified:

- Protect humans from exposure to groundwater by preventing use of groundwater as a drinking water source in the shallow aquifer, where concentrations of chemicals are higher than site health risk criteria or regulatory standards and guidance criteria.

In order to meet this objective, five alternatives, including a *No Action* alternative, were evaluated for managing the migration of contaminants in the groundwater. A descriptive summary of the five alternatives is presented in Section 3.0. An alternatives evaluation summary is presented in Section 4.0, and the preferred alternative is presented in Section 5.0.

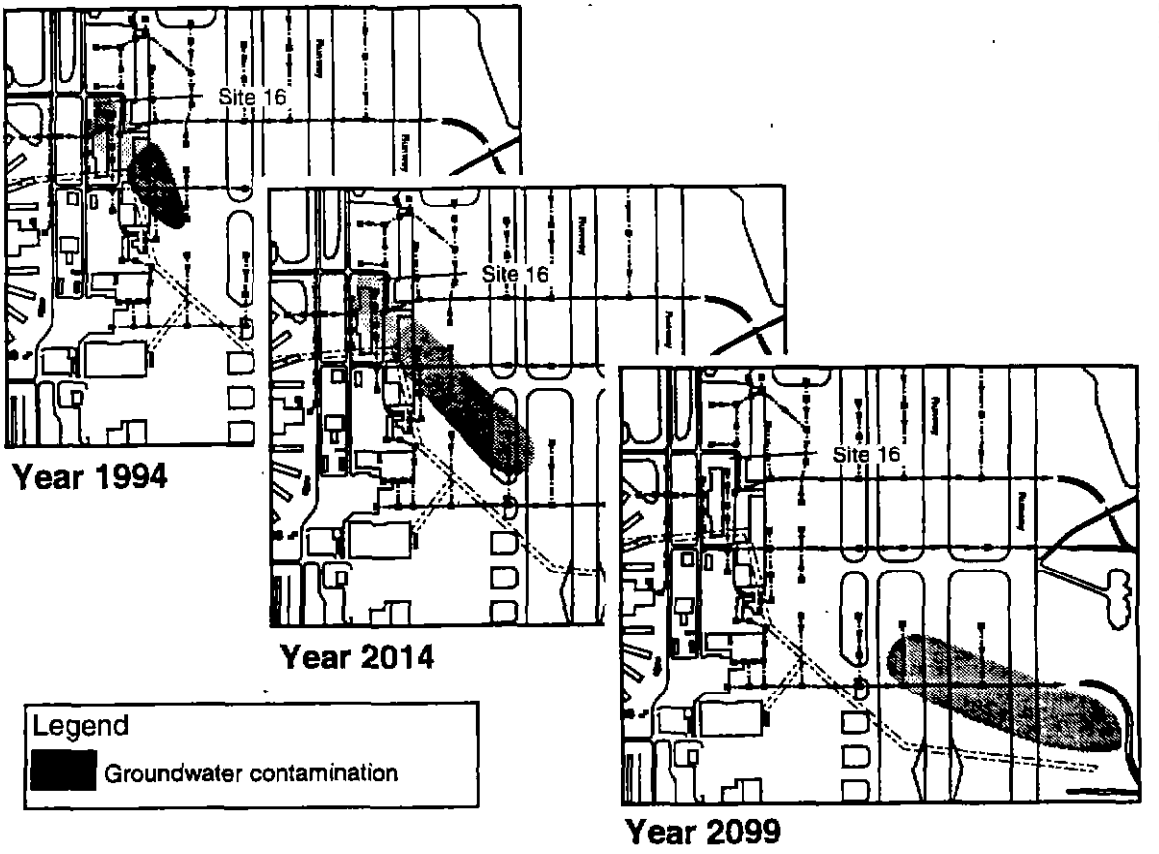
3.0 REMEDIAL ALTERNATIVES

Each of the five alternatives for addressing groundwater at OU 7 is discussed below. A description of each alternative is provided along with important factors to consider when evaluating each alternative.

MM-1, No Action. A No Action alternative is required by law. "No Action" means leaving the site the way it exists today. Groundwater use restrictions would be imposed by deed restrictions on land use plans and property deeds and annual reminders to owners of property affected by the contaminated groundwater. A formal request would be made to agencies administering the well installation permit program in Duval County to not issue permits for installation of drinking water wells that would pump water from the shallow aquifer. Groundwater quality monitoring and 5-year progress reviews would be established as part of this alternative. Figure 5 presents MM-1.

MM-2 Enhanced Bioremediation. This alternative consists of the enhancement of natural *biological degradation* processes to reduce contaminant concentrations in groundwater and administrative actions to limit the use of groundwater as a drinking water source. Bioremediation of *organic contaminants* by naturally occurring microorganisms would be enhanced by injection of nutrients into the groundwater. These nutrients provide food for the organisms, which in turn break down organic contaminants. Nutrient injection would occur for 12 years. Groundwater quality monitoring and 5-year progress reviews would also be conducted for a 30-year period. The administrative actions to limit use of the groundwater by the public would be similar to those proposed in MM-1. Figure 6 presents MM-2.

MM-3 Groundwater Extraction, Treatment, and Discharge to Surface Water. Alternative MM-3 consists of pumping the groundwater out of the ground for treatment. Although other treatment schemes are possible, the basis of the costs estimated in the FS is a treatment system where the extracted groundwater would be treated with *ultraviolet light* (UV) and an *oxidant* (OX), such as hydrogen peroxide, to destroy contaminants. The treated groundwater would then be pumped into a stormwater drain near the site. Regular sampling of the treated groundwater, prior to discharge to the stormwater drain, would be performed to confirm that satisfactory contaminant removal was occurring. Groundwater quality monitoring and 5-year progress reviews would be conducted for a 30-year period. The administrative actions to limit use of the groundwater



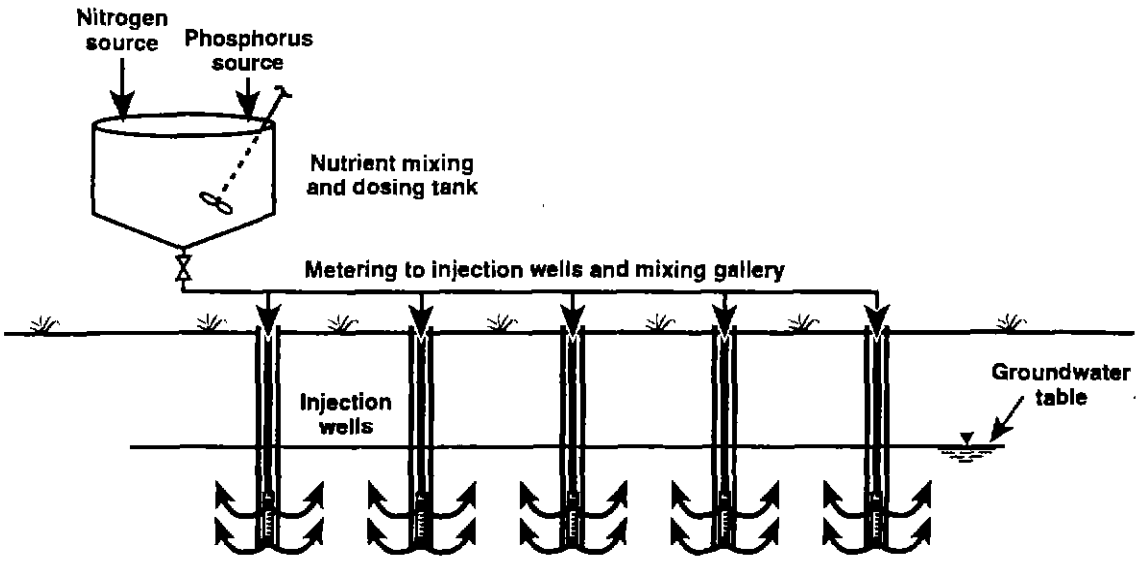
Alternative MM-1: No Action

- Groundwater monitoring
- Groundwater use restrictions
- 5-year reviews

Factors to consider:

- Cost of $524,000 for 30 years.
- Easy to implement.
- Consistent with the current and predicted future use of the site as an industrial facility.
- Does not provide for treatment of contaminants.
- Longest time required to meet remedial action objectives *(greater than 100 years).*
- Contaminants are allowed to disperse into the environment.

Figure 5. Alternative MM-1, No Action



Alternative MM-2: Enhanced Bioremediation

- Enhanced growth of microscopic organisms
- Groundwater monitoring
- Biodegradation monitoring
- Groundwater use restrictions
- 5-year reviews

Factors to consider:

- Cost of $2,256,000 over 30 years.
- Easy to construct; but experts are needed to operate system.
- Actively and permanently breaks down organic contaminants.
- Would take approximately 12 years to achieve State and Federal standards for organic contaminants.
- Inorganic contaminants are not treated.
- Would take approximately 100 years to achieve State and Federal standards for inorganic contaminants.
- Migration of contaminated groundwater would not be stopped.

Figure 6. Alternative MM-2, Enhanced Bioremediation

by the public would be similar to those proposed in MM-1. Figure 7 presents MM-3.

MM-4 Sparging of Groundwater. This alternative is similar to MM-2, as it is intended to reduce concentrations of organic compounds in the groundwater without extracting groundwater. *Air sparging* involves forcing air through injection wells into the groundwater. Organic contaminants in groundwater are removed by changing them into a gas (*volatilization*). This gas is then "sucked" through the dry soil above the water table and passed through a *granular activated carbon* (GAC) filter to remove the organic contaminants. The clean air is then released into the atmosphere. The carbon filter containing the contaminants would be taken offsite for treatment or disposal. Air sparging would occur for 12 years. Groundwater quality monitoring and 5-year progress reviews would be conducted for a 30-year period. The administrative actions to limit use of the groundwater by the public would be similar to those proposed in MM-1. Figure 8 presents MM-4.

MM-5 Groundwater Extraction, Pretreatment, and Discharge to a Wastewater Treatment Plant. MM-5 is essentially a modification of MM-3. This alternative consists of extraction, pretreatment of extracted groundwater via air stripping or other treatment process to remove organic contaminants, and discharge to a wastewater treatment plant over a 30-year period. It is anticipated that only the TCE will need to be removed from the groundwater prior to discharge to the wastewater treatment plant. MM-5 relies upon the existing wastewater treatment plant for treatment of other chemicals before discharge to surface water. Figure 9 presents MM-5. The administrative actions to limit use of the groundwater by the public would be similar to those proposed in MM-1.

4.0 ALTERNATIVE EVALUATION

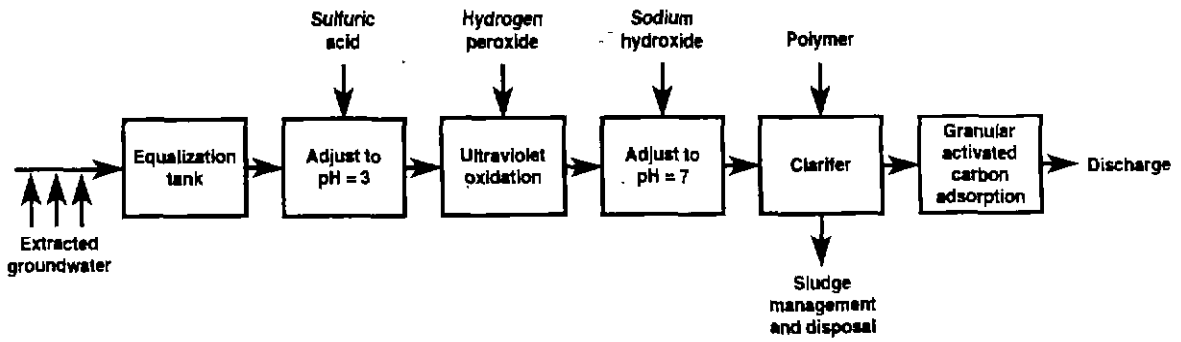
The action alternatives, MM-2 through MM-5, evaluated for OU 7 consist of two basic methods of treatment. Alternative MM-2, Enhanced Bioremediation, and MM-4, Sparging of Groundwater, are considered *in situ* treatment methods, as they do not require extraction of the groundwater as part of the treatment process. Alternative MM-3, Groundwater Extraction, Treatment, and Discharge to Surface Water, and MM-5, Groundwater Extraction, Pretreatment, and Discharge to a Wastewater Treatment Plant, are called pump-and-treat methods and require that the groundwater be extracted out of the ground prior to treatment. The two treatment methods differ in their ability to reduce the levels of inorganic contaminants in the groundwater and the time required to attain Federal and State standards for organic and inorganic contaminants.

The two treatment methods are each designed to actively reduce organic contaminant levels in the groundwater. The pump-and-treat method also includes a treatment step to reduce levels of inorganic contaminants, whereas the *in situ* treatment method relies on long-term, naturally occurring processes to reduce the levels of inorganic contaminants.

For the *in situ* method, a treatment time of 12 years to treat organic contaminants and a treatment time in excess of 100 years to treat inorganic contaminants is estimated. The estimated treatment time for the pump-and-treat method for both organic and inorganic contaminants is 30 years.

The *National Oil and Hazardous Substances Contingency Plan* outlines the approach for performing the *comparative analysis* of alternatives. The five alternatives are compared to nine criteria. The first seven criteria are technical criteria based on environmental protection, cost, and engineering feasibility. Table 1 presents an explanation of all nine criteria.

The nine criteria may be separated into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The preferred alternative must satisfy the threshold criteria. Primary balancing criteria weigh the major tradeoffs among alternatives. Modifying criteria will be considered after review of public comments received on this Proposed Plan. The comparative analysis of the five alternatives is provided in the following paragraphs.



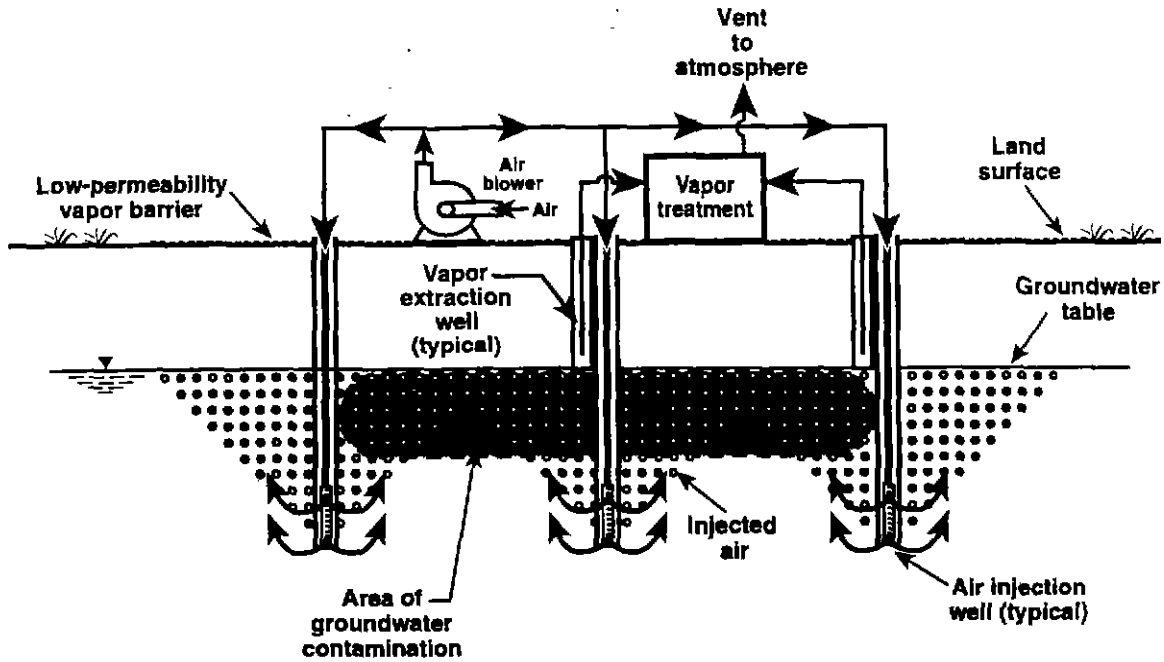
Alternative MM-3: Groundwater Extraction,Treatment, and Discharge to Surface Water

- Groundwater extracted using pumps
- Treatment to include:
  - pH adjustment
  - ultraviolet light radiation with oxidation (UV/OX)
  - polymer addition and clarification
  - granular activated carbon (GAC) adsorption
- Treated groundwater discharged to surface water (a tributary of Sal Taylor Creek)
- Groundwater and extraction/treatment system monitoring
- Groundwater use restrictions
- 5-year reviews

Factors to consider:

- Cost of $5,732,000 over 30 years.
- Approvals needed for discharge to tributary of Sal Taylor Creek.
- Uses reliable, established technologies.
- Organics are removed from the aquifer and destroyed.
- Inorganic contaminants are removed from the aquifer and treated.
- Takes 30 years to achieve action levels for organic and inorganic contaminants.
- Migration of contaminated groundwater would be stopped.
- Remedy is permanent.

Figure 7. Alternative MM-3, Groundwater Extraction, Treatment, and Discharge to Surface Water



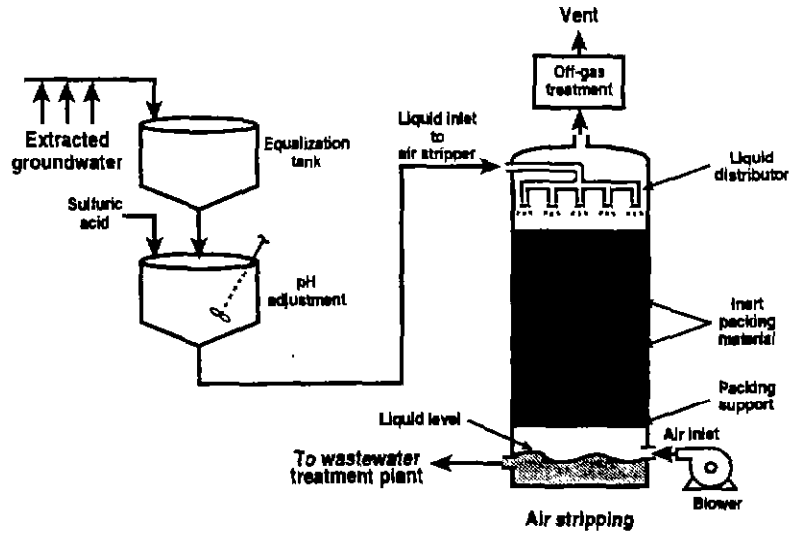
Alternative MM-4: Sparging of Groundwater

- Air injected into groundwater through wells
- Vaporized organics extracted from soil
- Vaporized organics treated to destroy contaminants
- Groundwater and treatment system monitoring
- Groundwater use restrictions
- 5-year reviews

Factors to consider:

- Cost of $1,829,000 over 12 years.
- Easy to install, but must be operated by experts.
- Removes and destroys organic contaminants from groundwater.
- Inorganic contaminants are not treated.
- Innovative approach.
- Would take approximately 12 years to achieve State and Federal standards *for organic contaminants.*
- Would take approximately 100 years to achieve State and Federal standards for inorganic contaminants.
- The migration of contaminants in groundwater is partially stopped.

Figure 8. Alternative MM-4, Sparging of Groundwater



Alternative MM-5: Groundwater Extraction, Pretreatment, and Discharge to the Wastewater Treatment Plant

- Groundwater extracted
- Organics transferred from groundwater to air in an enclosed air stripping unit
- Air treated prior to release to the atmosphere
- Treated groundwater discharged to a wastewater treatment plant
- Groundwater and extraction/treatment system monitoring
- Groundwater use restrictions
- 5-year reviews

Factors to consider:

- Cost of $3,672,000 over approximately 30 years.
- Easy to construct and operate.
- Organic contaminants removed from the aquifer and destroyed.
- Inorganic contaminants removed from the aquifer and treated.
- Migration of contaminants in groundwater stopped.
- Takes 30 years to achieve action levels for organic and inorganic contaminants.
- Remedy is permanent.

Figure 9. Alternative MM-5, Groundwater Extraction, Treatment, and Discharge to the Wastewater Treatment Plant

Table 1 Explanation of Evaluation Criteria	
Criteria	**Description**
Threshold	**Overall Protection of Human Health and the Environment.** This criterion evaluates the degree to which each alternative eliminates, reduces, or controls threats to human health and the environment through treatment, engineering methods, or institutional controls (e.g., access restrictions). **Compliance with State and Federal Regulations.** The alternatives are evaluated for compliance with environmental protection regulations determined to be applicable or relevant and appropriate to the site conditions.
Primary Balancing	**Long-Term Effectiveness.** The alternatives are evaluated based on their ability to maintain reliable protection of human health and the environment after implementation. **Reduction of Contaminant Toxicity, Mobility, and Volume.** Each alternative is evaluated based on how it reduces the harmful nature of the contaminants, their ability to move through the environment, and the amount of contamination. **Short-Term Effectiveness.** The risks that implementation of a particular remedy may pose to workers and nearby residents (e.g., whether contaminated dust will be produced during excavation), as well as the reduction in risks that results by controlling the contaminants, is assessed. The length of time needed to implement each alternative is also considered. **Implementability.** The technical feasibility and administrative ease (e.g., the amount of coordination with other government agencies needed) of a remedy, including availability of necessary goods and services, is assessed. **Cost.** The benefits of implementing a particular alternative are weighed against the cost of implementation.
Modifying	**U.S. Environmental Protection Agency (USEPA) and Florida Department of Environmental Protection (FDEP) Acceptance.** The final Feasibility Study and the Proposed Plan, which are placed in the Information Repository, represent a consensus by the Navy, USEPA, and FDEP. **Community Acceptance.** The Navy assesses community acceptance of the preferred alternative by giving the public an opportunity to comment on the remedy selection process and the preferred alternative and then responds to those comments.

Threshold Criteria

Overall Protection. The environment is not at risk from the contaminants present in groundwater at OU 7, and all of the alternatives provide varying degrees of protection of human health. Alternative MM-1 would only protect human health by restricting the use of the contaminated groundwater. Alternatives MM-2 and MM-4 include mechanical intervention to remove organic contaminants, but the effectiveness of these alternatives is less predictable, as they also rely on natural transformation processes and conditions at the site to remove inorganic contaminants.

Alternatives MM-3 and MM-5 are the most protective of human health. These methods use aggressive, proven, treatment systems that rely on mechanical intervention to directly remove both organic and inorganic contaminants from the groundwater. However, there remains some uncertainty whether or not cleanup levels in the aquifer can be attained through groundwater extraction.

Compliance with ARARs. All alternatives are anticipated to eventually achieve chemical-specific ARARs. Alternatives MM-3 and MM-5 are expected to meet all ARARs for both organic and inorganic contaminants within 30 years. Alternatives MM-2 and MM-4 are expected to meet the ARARs for organic contaminants within 12 years and the ARARs for inorganic contaminants within 100 years.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. All alternatives are expected to be effective at meeting the objective after a sufficient period of time. Alternatives MM-1, MM-2, MM-3, and MM-4 are independent of possible changes to the infrastructure at Cecil Field; however, MM-5 is dependent upon the existing wastewater treatment plant. If it were closed before ARARs were met, treatment at the local wastewater treatment plant would be required prior to discharge to surface water.

Reduction in Toxicity, Mobility, and Volume. Except for reductions in toxicity and volume accomplished by natural transformation processes, MM-1 would not reduce the toxicity, mobility, or volume of contaminants in the groundwater. Reduction of toxicity associated with the organic contaminants will be achieved by biodegradation in MM-2 and volatilization in MM-4. MM-2 and MM-4, like MM-1, rely on long-term, unassisted, natural transformation processes for the reduction in toxicity of inorganic contaminants. Alternatives MM-2 and MM-4 do not include a method for controlling the mobility or migration of the contaminants.

The treatment processes included in Alternatives MM-3 and MM-5 will reduce the toxicity and volume of both organic and inorganic contaminants in the groundwater. The extraction of groundwater prior to treatment will effectively prevent migration of contaminants away from the site, thus achieving a reduction in the mobility of the contaminants.

Short-Term Effectiveness. Alternatives MM-3, MM-4, and MM-5 are expected to begin reducing the organic contaminant concentrations almost immediately following implementation. Alternative MM-2, which relies upon biological processes, will be slightly slower because the bacteria that will eventually multiply and begin using the organic contaminants in the groundwater as a food source, are sensitive to their environment and require a period of acclimation. Alternative MM-1 relies on natural processes without enhancement and is, therefore, the slowest method in the short term for organic contaminant reduction. Regarding inorganic contaminants, Alternatives MM-3 and MM-5 rely strictly on proven technologies for contaminant removal and are, hence, expected to be nearly immediately effective. Alternatives MM-1, MM-2, and MM-4 provide no means, other than unassisted, naturally occurring processes, for inorganic contaminant reduction.

Implementability. Alternative MM-1, which includes only administrative actions, would be the easiest to implement. Alternatives MM-2 and MM-4 are also relatively easy to implement. MM-2 requires the installation of nutrient injection wells, monitoring wells, and administrative actions to restrict groundwater use. MM-4 requires installation of air sparging, vapor extraction, monitoring wells, and administrative actions to restrict groundwater use. Alternatives MM-3 and MM-5 are both pump-and-treat methods. However, MM-5 would be easier to construct because, in addition to extraction and monitoring wells, it would require only an air stripper for treatment of groundwater prior to

discharge to the wastewater treatment plant. MM-3 requires construction of a more comprehensive treatment system including a UV/OX system, clarifier, and GAC unit, in addition to monitoring and extraction wells.

Cost. Estimated costs range from $524,000 for MM-1 to over $5,732,000 for MM-3.

Modifying Criteria

State and Federal Acceptance. The FDEP and USEPA have concurred with the Navy that Alternatives MM-2 through MM-5 would be preferable to MM-1.

Community Acceptance. Community acceptance of the preferred alternative (see Section 5.0) will be evaluated after the public comment period ends. Public comments will be addressed in the Responsiveness Summary prepared in conjunction with the ROD for OU 7.

5.0 PREFERRED ALTERNATIVE

The preferred alternative is a combination of MM-2, Enhanced Bioremediation, and MM-5, Groundwater Extraction, Pretreatment, and Discharge to a Wastewater Treatment Plant, and is hereafter called MM-6.

What is MM-6?
For MM-6, the treatment method proposed for MM-5 would be installed in the area of the highest contaminant concentrations (the source area). This treatment method, air stripping and discharge to the wastewater treatment plant, would remove and treat most of the contaminant plume in the source area. Away from this area (i.e., the downgradient area), MM-2 would be installed to treat contaminants. In this area, organic contaminants will be broken down to harmless substances by bioremediation, a naturally occurring process. Figure 10 depicts MM-6.

Why Choose MM-6?
By implementing MM-6, groundwater and residual dense nonaqueous-phase liquids in the source area would be contained from further migration, and higher concentrations of contaminants would be removed through extraction and treatment in an air stripper. Contaminated groundwater downgradient of the source area would be treated through biodegradation of organic compounds. It is estimated that MM-6 would cost approximately $2,360,000 over the initial 12-year period (5 years of pumping and treatment of groundwater and 12 years of nutrient addition) and an additional $556,000 if continued operation and maintenance of the system is needed for a total of 30 years.

Why Were MM-2 and MM-5 Chosen over MM-1, MM-3, and MM-4?
If MM-1 were chosen, no action would be taken at the site, and risks would not be reduced. Because risks must be reduced, MM-1 was eliminated from consideration. MM-2 was chosen over MM-4 because MM-2 would treat a range of organic contaminants while MM-4 would only treat the more volatile organic contaminants; MM-2 is easier to construct, operate, and maintain over a long period of time; and MM-2 is less expensive than MM-4. MM-5 was chosen over MM-3 because MM-5 would be easier to construct and install, MM-5 is easier to operate and maintain over a long period of time, and MM-5 is less expensive than MM-3.

Table 2 provides a summary of the activities to be performed for each alternative along with projected costs and length of time to achieve action levels.

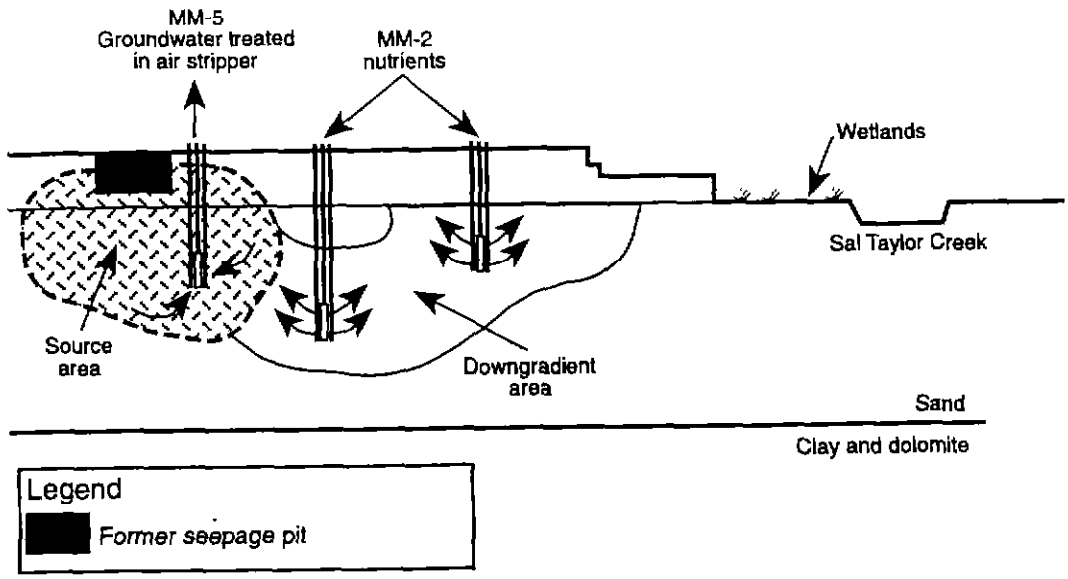
How Does MM-6 Compare to the Nine criteria?
Table 3 shows how MM-6 compares to the nine criteria.

6.0 UPCOMING SITE-RELATED COMMUNITY PARTICIPATION ACTIVITIES

Public Comment Period

The public comment period for the Proposed Plan is the next step in selecting the preferred alternative for OU 7. A public comment period will be held from March 21 to April 22, 1996, to accept comments on the Proposed Plan for OU 7.

During the public comment period, interested parties may submit written comments to Mr. Bert Byers, the NAS Cecil Field Public Affairs Officer, at the address listed below. Comments must be postmarked no later than April 22, 1996. Based on public comments or new information, the Navy may modify the preferred alternative or choose one or more of the other alternatives developed in the FS.



Alternative MM-6:

Source area: Groundwater extraction, pretreatment, and discharge to a wastewater treatment plant

Downgradient area: Enhanced bioremediation

- Groundwater extracted in the source area and treated in enclosed air stripping unit
- Treated groundwater discharged to a wastewater treatment plant
- Enhanced growth of microscopic organisms in downgradient area
- Groundwater and biodegradation monitoring
- Groundwater use restrictions
- 5-year reviews

Factors to consider:

- Cost of $2,360,000 for 12 years.
- Cost of $556,000 for treatment up to 30 years.
- Provides for treatment of organic and inorganic contaminants.
- Actively and permanently breaks down organic contaminants.

Figure 10. Alternative MM-6, the Preferred Alternative

Table 2
Remedial Alternatives for OU 7 Groundwater

Alternatives	MM-1 No Action	MM-2 Enhanced Bioremediation	MM-3 Groundwater Extraction, Treatment, and Discharge to Surface Water	MM-4 Sparging of Groundwater	MM-5 Groundwater Extraction, Pretreatment, and Discharge to a Wastewater Treatment Plant	Preferred Alternative: MM-6 (Combination of MM-2 and MM-5)
Activities	• Groundwater monitoring. • Groundwater use restrictions. • 5-year review.	• Encourage growth of microscopic organisms. • Groundwater monitoring. • Biodegradation monitoring. • Groundwater use restrictions. • 5-year reviews.	• Groundwater extraction. • Treatment to include: - pH adjustment - UV/OX - Polymer addition and clarification - GAC adsorption • Treated groundwater discharged to surface water. • Groundwater and extraction/treatment system monitoring. • Groundwater use restrictions. • 5-year reviews.	• Air injected into groundwater through wells. • Vaporized organics extracted from soil. • Vaporized organics treated to destroy contaminants. • Groundwater and treatment system monitoring. • Groundwater use restrictions. • 5-year reviews.	• Groundwater extraction. • Organics transferred from groundwater to air in an enclosed air stripping unit. • Air treated prior to release to the atmosphere. • Treated groundwater discharged to a wastewater treatment plant. • Groundwater and extraction/treatment system monitoring. • Groundwater use restrictions. • 5-year reviews.	• See MM-2 and MM-5
Estimated Cost (present worth, 30 years)	$524,000	$2,256,000	$5,732,000	$1,829,000	$3,672,000	$2,916,000
Time to reduce risk due to COPC	>100 Years	12 Years	30 Years	12 Years	30 Years	5 to 12 years
Time to achieve ARARs	>100 years	>100 years	30 years	>100 years	30 years	30 to 100 years

Notes: OU = operable unit.
MM = management of migration.
UV/OX = ultraviolet/oxidation.
GAC = granular activated carbon.
> = greater than.
ARARs = applicable or relevant and appropriate requirements.
COPC = contaminants of potential concern.

Table 3 Analysis of the Preferred Alternative, MM-6	
1. Overall protection of human health and the environment *Will the alternative protect people and the environment?*	The preferred alternative treats organic and inorganic contaminants. Human health will be further protected by restricting the use of groundwater in the immediate area until Florida and Federal drinking water standards are met.
2. Compliance with State and Federal regulations *Will it meet Florida and Federal legal requirements?*	Organic compound concentrations would reach State and Federal standards between 5 and 30 years; inorganic compounds would reach standards in 30 years in the source area and 100 years in the downgradient area.
3. Long-term effectiveness *After cleanup is completed, will there be risks remaining at the site?*	Use of groundwater for drinking water will be restricted until the water is determined to be safe according to State and Federal drinking water standards.
4. Reduction of contaminant toxicity, mobility, and volume *Will it reduce harmful qualities of the contaminant? Make it smaller? Keep it from moving away from its current location?*	Organics in the source area will be destroyed with air stripping; inorganics in the source area will be removed in a wastewater plant. Downgradient, organic contaminants will be broken down into less harmful substances by enhancing bioremediation. Pumping water out of the ground for treatment will prevent movement of contaminants away from the source area.
5. Short-term effectiveness *How long will it take to complete the cleanup? Will there be any health risks during the cleanup?*	The concentrations of organic and inorganic contaminants in the source area will be reduced almost immediately. The reduction of concentrations of organic contaminants in the downgradient area will be slightly slower because the microbes need time to adjust to their new, enriched environment. The cleanup action will be designed and monitored to ensure the safety of workers and the community during the cleanup action.
6. Implementability *Will it be possible to make it work?*	The treatment methods proposed for the preferred alternative have been successfully implemented at other sites.
7. Cost *What will it cost?*	The estimated cost for MM-6 is $2,916,000.
8. USEPA and FDEP acceptance *Will the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) accept it?*	The FDEP and USEPA have concurred with the Navy that this is the preferred alternative.
9. Community acceptance *Will the community accept it?*	Community acceptance of this preferred alternative will be evaluated after the public comment period.

Public Meeting

All interested parties are encouraged to attend a public meeting to learn more about the alternatives developed for the site. The public meeting will also provide an additional opportunity to ask questions and submit comments on this Proposed Plan to the Navy. The meeting time and location are provided below.

Date: March 21, 1996
Time: 7:00 p.m.
Location: Eisenhower Room in the Bachelor Officers' Quarters at NAS Cecil Field

Signing of the ROD

Following evaluation of comments received during the public comment period, the USEPA, FDEP, and the Navy will sign an ROD for OU 7. The ROD will detail the alternative chosen for the site and will include the Navy's responses to comments received during the public comment period. Once the design of the selected alternative is complete, the remedial action will begin.

Ongoing Informational Updates

NAS Cecil Field will keep the local community informed about new developments at OU 7 by preparing fact sheets and distributing them to individuals on the NAS Cecil Field mailing list. If you would like to be added to the mailing list, please contact Bert Byers at the address provided in the following subsection.

Available Information

Copies of the documents prepared by the Navy during its investigation of OU 7, including the RI, BRA, and FS, are available for review at the following Information Repository:

Charles D. Webb Wesconnett Branch
Jacksonville Public Library
6887 103rd Street,
Jacksonville, FL 32210
(904) 778-7305

For further information on OU 7 or any other *Installation Restoration program* activities at NAS Cecil Field, please contact:

Bert Byers, Public Affairs Officer
NAS Cecil Field
P.O. Box 111,
Jacksonville, FL 32215-0111
(904) 778-6055

7.0 GLOSSARY

Air sparging: Dissolved volatile (easily evaporated) organics are removed from groundwater by injecting air into the groundwater to cause turbulence. This prompts transfer of dissolved organics from the liquid to the gas phase, and enhances aerobic biological degradation of organic compounds. Volatile organics are collected from soil above the groundwater surface. The collected vapors are further treated before they are released into the atmosphere.

Anomaly: A measurement or observation that deviates from expected or known conditions.

Anomole: A disturbance in the measurements of geophysical equipment that could indicate disturbed soils or a buried object.

Applicable or relevant and appropriate requirements (ARARs): The Federal and State requirements that a selected alternative must meet. These requirements may vary among sites, chemicals, and alternatives considered.

Aquifer: An underground layer of rock, sand, or gravel capable of storing and transmitting water within cracks and pore spaces or between grains. The water contained in an aquifer is called groundwater.

Baseline risk assessment: The evaluation performed to estimate the risk posed to human health or the environment by specific contaminants at a specific site.

Biological degradation: The use of bacteria or other microscopic organisms to break down harmful or complex organic materials into less complex materials, such as carbon dioxide and water.

Comparative analysis: A method for comparing the remedial alternatives to one another.

Comprehensive Environmental Response, Compensation, and Liability Act: An act of Congress that established Superfund and the laws that must be followed when cleaning up certain hazardous waste sites.

Dense nonaqueous-phase liquids (DNAPLs): A certain set of organic chemicals that are denser than water. These chemicals tend to sink to the bottom of an aquifer.

Feasibility study (FS): A description of the remedial action objectives and an engineering analysis of the potential cleanup alternatives for a site.

Field investigation: The component of the study of a waste site that includes sampling of environmental media and studies of the chemical, ecological, and physical characteristics of the site.

Florida Department of Environmental Protection (FDEP): The State agency that is involved in identifying and enforcing regulations and concurring with the preferred remedy at a site.

Geophysical survey: Field investigations using magnetics, sound, or radar to determine subsurface conditions.

Granular activated carbon (GAC): A material which traps organic molecules. GAC is used to filter organic molecules out of water. This is essentially the same process used in the filter of most household aquariums.

Ground penetrating radar: A geophysical survey method used to evaluate subsurface conditions at a site.

Groundwater: Water found within an *aquifer*.

Hazardous waste: A waste defined by regulation 40 CFR 261 that, in certain quantities, may be harmful to human health or the environment.

Information Repository: A public file containing the administrative record, site information, documents on site activities, and general information about the site.

Initial assessment study (IAS): The process of collecting and reviewing information to identify solid waste management units and potential releases of contamination. The IAS determines the need for further investigation.

Inorganics: Chemical compounds that cannot be classified as organics.

Installation Restoration program: A program designed by the Navy for cleaning up contaminated sites at Navy bases.

Interim remedial action: Steps that are taken during the RI and FS process to manage or remove contamination.

Monitoring wells: Wells installed to monitor (through sampling and analysis) the quality of groundwater.

National Oil and Hazardous Substances Contingency Plan: The Federal regulation (40 Code of Federal Regulations Part 300) that guides the Superfund program. The Navy's *Installation Restoration program* is patterned after the Superfund program.

No Action: No treatment methods are used to cleanup contaminated media.

Organic compounds: Chemical compounds that contain hydrogen and carbon. Volatile and semivolatile organic compounds are sometimes grouped and referred to as "organics."

Operable unit (OU): Grouping of sites based on types of waste disposed of and/or the suspected contaminants of concern.

Preferred alternative: The alternative that is believed to provide the best balance of tradeoffs among the alternatives being considered, with respect to the nine evaluation criteria.

Proposed Plan: A document that describes all the alternatives considered for addressing contamination at the site, including a description of the preferred alternative for remedial action at the site.

Public comment period: A specified period of time during which the public is encouraged to comment on a particular decision or document in the remedial process, such as the Proposed Plan or the FS.

Record of Decision (ROD): The document, signed by the Navy, FDEP, and USEPA, that records the rationale and ultimate cleanup decision for a given site or operable unit.

Remedial action objective: The cleanup goal that must be met by the selected alternative for a remedial action.

Remedial alternative: A combination of technical and administrative methods developed and evaluated in the FS that can be used to treat or manage contamination at a site.

Remedial investigation (RI): The collection and analysis of information about a site to estimate the nature and extent of contamination that may be present. The investigation also evaluates how conditions at the site may affect human health and the environment.

Resource Conservation and Recovery Act (RCRA): A Federal law that establishes requirements for the storage, treatment, and disposal of hazardous wastes, and corrective action for hazardous waste released to the environment.

Restoration Advisory Board (RAB): An advisory board, composed mainly of concerned citizens and supported by representatives of the Navy, USEPA, and FDEP, tasked with advising NAS Cecil Field on activities associated with environmental restoration.

RCRA facility investigation (RFI): An investigation of sites at facilities holding an RCRA permit. The RFI estimates the nature and extent of contamination at the site.

Responsiveness summary: A section within the ROD that presents the Navy's responses to public comments on the FS and the Proposed Plan.

Sediment: Topsoil, sand, organic material, and minerals washed from land into water, usually after rain.

Semivolatile organic compound (SVOC): Compounds containing hydrogen and carbon that are slightly prone to evaporation into the atmosphere (but not as prone to evaporation as volatile organic compounds).

Surface water: All water naturally open to the atmosphere (such as rivers, lakes, and ponds).

Toxicity: A measure of the ability of a substance to damage living tissue or impair normal biological functions.

U.S. Environmental Protection Agency (USEPA): The Federal agency responsible for identifying and enforcing regulations and concurring with the preferred remedy at a site.

UV/OX: A treatment method that uses a combination of ultraviolet (UV) light and oxidation (OX) to destroy organic contaminants.

Volatile organic compound (VOC): Any compound containing hydrogen and carbon that readily evaporates into the atmosphere.

Volatilization: The process of changing from the solid or liquid phases into a gaseous phase.

Wetland: Areas that are soaked by surface water or groundwater frequently enough, or for sufficient duration, to support specific plants and animals, such as cattails.