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1996

EPA Superfund
Record of Decision:

USN AIR STATION CECIL FIELD
EPA ID: FL5170022474
OU 07
JACKSONVILLE, FL
09/16/1996

<IMG SRC 0496271>

RECORD OF DECISION OPERABLE UNIT 7

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

UNIT IDENTIFICATION CODE: N60200 CONTRACT NO.
N62467-89-D-0317/090 <IMG SRC 0496271A> JULY 1996

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND <IMG SRC
0496271B> NORTH CHARLESTON, SOUTH CAROLINA 29419-9010

<IMG SRC 0496271C>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

345 COURTLAND STREET, N.E. ATLANTA GEORGIA 30365

SEP 17 1996

4WD-FFB

CERTIFIED MAIL RETURN RECEIPT REQUESTED

Commanding Officer Mr. Steve Wilson, P.E. Department of the Navy Southern
Division Naval Facilities Engineering Command P.O. Box 190010 2155 Eagle Drive
North Charleston, South Carolina 20419-9010

SUBJ: Cecil Field Naval Air Station, Record of Decision for Operable Unit-7

Dear Mr. Wilson:

The Environmental Protection Agency (EPA) has received and reviewed the final Record of Decision (ROD) for Operable Unit 7 (OU-7). EPA concurs with the Navy's decision as set forth in the ROD dated July 31, 1996. This concurrence is contingent with the understanding that the proposed action is intended to reduce risk to human health and the environment, and should additional work be required to achieve this risk reduction, the Navy is liable for this action if any is required.

Prior to designation for closure, NAS Cecil Field was listed on the National Priorities List as Cecil Field Naval Air Station and the Installation Restoration Program for 18 sites was funded and underway. These 18 sites were grouped by usage and waste type to form eight operable units. OU-7 is made up of site 16. At Cecil Field there are numerous areas of soil, sediment and groundwater contamination. The role of this ROD in the NAS Cecil Field overall site strategy is to remediate groundwater contamination associated with site 16. OU-7 located near the flightline and future development of the groundwater is not expected. However, remedial action was deemed necessary because groundwater at Cecil Field is considered Class II and has the potential for development.

EPA appreciates the opportunity to work with the Navy on these sites and other sites at Cecil Field. Should you have any questions, or if EPA can be of any assistance, please contact Ms. Deborah Vaughn-Wright, of my staff, at the letterhead address or at (404) 347-3555, extension 2058.

<IMG SRC 0496271D>

cc: Mr. James Crane, FDEP Mr. Eric Nuzie, FDEP Mr. Michael Deliz, FDEP
Mr. Mark Davidson, SOUTHDIV

<IMG SRC 0496271E> DEPARTMENT OF THE NAVY

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

P.O. BOX 190010 5090/13 1875 2155
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31 July 96

NORTH CHARLESTON, S.C. 29419-9010

USEPA-Region IV Attn: Ms. Debbie Vaughn-Wright-Remedial Project Manager Federal Facilities Section, Waste Management Div. 345 Courtland Street, N.E. Atlanta, GA 30365

Subject: Contract No. N62467-89-D-0317, CTO 090 Final Record of Decision Operable Unit 7, Site 16 Naval Air Station Cecil Field Installation Restoration Program

Dear Ms. Vaughn-Wright:

Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) is pleased to forward for your review three copies of the subject document.

Comments or questions you may have concerning this document should be directed to me within thirty calendar days from the receipt of this document. You can reach me at (803) 820-5669 if you have any questions.

<IMG SRC 0496271F>

Attachment: (1) Final Record of Decision, Operable Unit 7 (Site 16), NAS Cecil Field

Copy to: FDEP (Mr. Eric Nuzie-3 copies) NAS Cecil Field (Mr. Dave Kruzicki - 2 copies) City of Jacksonville (Mr. Gerry Young) BECHTEL (Mr. Hermann Bauer) Jacksonville Public Library-Wesconnett Branch ABB-ES (Mr. Rao Angara)(w/o encl) SOUTHNAVFACENGCOM (Mr. Steve Wilson)(w/o encl)

RECORD OF DECISION OPERABLE UNIT 7

NAVAL AIR STATION CECIL FIELD JACKSONVILLE,
FLORIDA

Unit Identification Code: N60200

Contract No. N62467-89-D-0317/090

Prepared by:

ABB Environmental Services, Inc. 2590 Executive
Center Circle, East Tallahassee, Florida 32301

Prepared for:

Department of the Navy, Southern Division Naval
Facilities Engineering Command 2155 Eagle Drive North
Charleston, South Carolina 29418

Alan Shoutlz, Code 1875, Engineer-in-Charge

July 1996

1.0 DECLARATION FOR THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION. Operable Unit (OU) 7 is located in the industrial area of the main base of Naval Air Station (NAS) Cecil Field, Jacksonville, Florida. OU 7 consists of Site 16, Aircraft Intermediate Maintenance Department (AIMD) Seepage Pit. Site 16 is located at the intersection of Jet Road and 6th Street, approximately 1,600 feet west of the north-south runways.

1.2 STATEMENT OF BASIS AND PURPOSE. This decision document presents the selected remedial action for OU 7, located at NAS Cecil Field, Jacksonville, Florida, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations 300). This decision document was prepared in accordance with th U.S. Environmental Protection Agency (USEPA) decision document guidance (USEPA, 1992). This decision is based on the Administrative Record for OU 7.

The USEPA and the State of Florida concur with the selected remedy.

1.3 ASSESSMENT OF THE SITE. Releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment if groundwater from the surficial aquifer were used as a potable water source.

1.4 DESCRIPTION OF THE SELECTED REMEDY. This ROD is the final action for OU 7. The selected remedy for management of contaminated soil at OU 7 was addressed in the March 1994 interim ROD (IROD). The interim remedial action (IRA) was completed in June 1994. Approximately 1,578 tons of contaminated soil were excavated and disposed of at a Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste landfill.

IRA construction activities were initiated in May 1994, cost approximately $700,000, and were completed in June 1994. The Florida Department of Environmental Protection (FDEP) approved the closure certification in February 1995.

The alternative selected for managing contaminated groundwater at OU 7 includes groundwater extraction and treatment in one area and in situ bioremediation in another area. The major components of the selected remedy are listed below.

1. Groundwater Extraction, Pretreatment, and Discharge to a Wastewater Treatment Plant

   - Extract groundwater from the area with the highest contaminant concentrations (the source area).
   - Pretreat contaminated groundwater via air stripping or other treatment process to remove target organic contaminants.
   - Discharge treated groundwater to a wastewater treatment plant.
   - Monitor groundwater quality and treated groundwater.
   - Institute controls and restrict the use of groundwater for a potable water supply from the surficial aquifer.
   - Conduct progress reviews every 5 years.

2. Groundwater Treatment, Enhanced Bioremediation

   - Treat groundwater within the downgradient area through bioremediation until the remedial action objective is met.

- Inject nutrients into the groundwater to enhance bioremediation of organic contaminants by naturally occurring microorganisms.

- Monitor groundwater quality.

- Institute controls and restrict the use of groundwater from the surficial aquifer as a potable water supply during the life of remedial action.

- Evaluate the effectiveness of enhanced bioremediation.

- Conduct progress review every 5 years.

The selected remedy for OU 7 groundwater is estimated to cost $2,360,000 over an initial 12-year period (5 years of pumping and treatment of groundwater and 12 years of nutrient addition) and an additional $556,000 for continued operation and maintenance for 30 years. The 30-year present worth cost of this alternative is $2,916,000.

1.5 STATUTORY DETERMINATIONS. The selected remedy is protective of human health and the environment, and is cost-effective. The nature of the selected remedy for OU 7 is such that contaminant concentrations in groundwater may remain above regulatory standards during the remedial action. As a result, applicable or relevant and appropriate requirements (ARARs) will not be met as a near-term goal, but would be met as a long-term goal. The remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element. Because this remedy would result in hazardous substances remaining onsite above health-based levels, a review would be conducted within 5 years after the commencement of remedial actions to ensure that the remedy continues to provide adequate protection of human health and the environment.

1.6 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF THE REMEDY.

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2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION. NAS Cecil Field occupies more than 31,000 acres and is located 14 miles southwest of Jacksonville, Florida. The majority of Cecil Field is located within Duval County; the southernmost part of the facility is located in northern Clay County (Figure 2-1).

The area surrounding NAS Cecil Field is rural and sparsely populated. The city of Jacksonville lies approximately 14 miles to the northeast. Surrounding land use is primarily forestry with some light agricultural and ranching use. Small communities and scattered dwellings associated with these activities are located in the vicinity. A small residential area on Nathan Hale Road, which abuts the NAS Cecil Field property to the west, typifies these rural communities. The nearest incorporated municipality is the town of Baldwin, whose center lies approximately 6 miles to the northwest of the main facility entrance.

To the east of NAS Cecil Field, the rural surroundings grade into a suburban fringe bordering the major east-west roadways. Low commercial use, such as convenience stores, and low density residential areas characterize the land use (ABB Environmental Services, Inc. [ABB-ES], 1992b). A development called Villages of Argyle, when complete, is planned to consist of seven separate villages or communities that will ultimately abut NAS Cecil Field to the south and southeast. A golf course and residential area also border NAS Cecil Field to the east (Southern Division, Naval Facilities Engineering Command [SOUTHNAVFACENGCOM], 1989).

There is no housing in the immediate vicinity of OU 7. However, bachelor enlisted quarters are located approximately 500 feet to the west, family enlisted housing is approximately 1,500 feet to the northwest, and senior officer housing is approximately 2,000 feet to the west. Children would be expected to reside only in the family enlisted housing or the senior officer housing areas.

NAS Cecil Field was established in 1941 and provides facilities, services, and material support for the operation and maintenance of naval weapons, aircraft, and other units of the operation forces as designated by the Chief of Naval Operations. Some of the tasks required to accomplish this mission over past years included operation of fuel storage facilities, performance of aircraft maintenance, maintenance and operation of engine repair facilities and test cells for turbo-jet engines, and support of special weapons systems.

OU 7, also known as, Site 16, includes the AIMD seepage pit, bead separator, holding tank, associated pipelines from Building 313, and adjacent areas affected by these facilities. OU 7 is located in the industrial area, west of and adjacent to the north-south jet runways on NAS Cecil Field. The AIMD seepage pit is located 60 feet north of Building 313. Currently, the Jet Engine Maintenance Shop and Non-Destructive Inspection (NDI) Laboratory are located in Building 313. A map of the historical OU 7 layout is provided on Figure 2-2.

OU 7 is vegetated with grass that is mowed regularly. The general area adjacent to OU 7 is relatively flat and is covered with asphalt and concrete. The immediate area is crisscrossed with several utilities (Figure 2-2), including a water line, overhead steam line, fire water main, a sanitary-sewer main, and storm-water sewers (both active and abandoned). There are no inlets to the storm sewer system in the immediate vicinity of OU 7 (ABB-ES, 1992). In 1988 and during the site visits conducted by ABB-ES in 1993, the ground surface exhibited no evidence (staining or absence of vegetation) of adverse effects from previous waste activities at the site.

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Surface water flow from OU 7 is typically toward the adjacent paved roads and parking lots. To the east, an unlined grass drainage swale may receive some runoff and carry it toward a catch basin. The runoff from the paved roads and parking lots in the vicinity of OU 7 ultimately flows to the NAS Cecil Field storm-water sewer system (Harding Lawson Associates, 1988).

The storm-sewer system collects surface water runoff in catch basins and transports it through underground piping and discharges into drainage ditches that lead to the wetlands on the east side of the runways and eventually discharge into Sal Taylor Creek farther to the east. Most of the storm sewer trunk lines (main lines) intersect the water table as do some of the lateral lines (smaller sewer lines draining into the trunk lines).

Prior to construction of the runways (circa 1952), runoff was transported from the area of OU 7 to the wetlands via a drainage ditch. During construction of the runways, the ditch was filled and the storm drain system discussed above was installed.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES. From 1959 until 1980, greases, rusts, scale, and paint wastes generated during a machine and engine parts cleaning process, along with glass beads and blasting grit from the airframes blasting shop, were disposed of at OU 7. Most wastes were discharged to the seepage pit area north of Building 313, but some were reportedly dumped on the ground on the east side of the building. Based on operations occurring within Building 313 during this time, waste components disposed of may have included sodium cyanide, trichloroethene (TCE), creosol, phenol, methylene chloride, and oil (Harding Lawson Associates, 1988).

Liquid waste generated from operations conducted within Building 313 drained toward a floor sump located at the north end of the building (Figure 2-2). This sump was connected via a vitrified clay pipe to a 4,100-gallon underground concrete holding tank located north of the building. The holding tank acted as a surge tank for the adjacent seepage pit. The holding tank contained a sump equipped with a sump pump and was constructed so that wastes could be pumped from the sump into either the seepage pit located north of the holding tank or the NAS Cecil Field storm-sewer system (vis 6-inch vitrified clay pipe). The seepage pit was constructed with concrete blocks on top of a concrete slab and measured approximately 40 feet long by 3 feet wide by 10 feet deep. One-half-inch gaps were left between the vertical intersections of the concrete blocks, and no mortar was used within these gaps. The construction of the seepage pit allowed for seepage of wastes directly into the subsurface soil and groundwater. The date of the installation of this system is unknown; however, the tank is believed to have been installed concurrently with the seepage pit (C. Vargas & Associates, Ltd., 1981).

Glass beads and blasting grit from sandblasting operations within Building 313 were allowed to enter the system through the sump in the building. Subsequently, glass beads accumulated within the tank and seepage pit and caused the system to malfunction. In the late 1960s, a 4-inch vitrified clay discharge pipe was installed in the seepage pit to allow drainage to the NAS Cecil Field storm-sewer system. The discharge pipe was installed approximately 3 feet above the base of the seepage pit. This pipe was installed so that when the level of wastewater within the seepage pit reached the level of the discharge pipe, the wastewater would overflow to the storm-sewer system. The storm sewer that received discharge directly from the holding tank eventually discharges to a series of open ditches, east of the north-south runways, that empty into Sal Taylor Creek (Harding Lawson Associates, 1988). The distance from OU 7 to Sal Taylor Creek is approximately 5,000 feet.

Use of the seepage pit was discontinued in 1980, and pipelines leading from the tank to the seepage pit were removed and the tank's outlet to the seepage pit was plugged. As shown on Figure 2-2, pipelines from the tank to the storm-sewer system were partially removed and plugged, and the pipelines leading from the seepage pit to the storm-sewer system were also plugged. The length of pipe removed before plugging is unknown; soil was left in place during pipe removal and plugging activities. During these activities, the top 4 feet of the seepage pit were removed, and the pit was backfilled with clean sand. Concurrently, a bead separator, for gravity settling of glass beads from the wastewater, was installed to the west of this system. This separator was connected to another sump located within the building via ductile iron pipes. Discharge from the bead separator was connected to the NAS Cecil Field sanitary-sewer system via 4-inch ductile iron pipes (C. Vargas & Associates, LTD, 1981). Wastewater discharge from Building 313 continued after the installation of the bead separator.

From 1980 until 1989, the holding tank was used for 90-day storage of hazardous waste. This activity was permitted under the facility's RCRA hazardous waste storage permit number 8016-122017. This permit was granted in 1987 by the USEPA and the FDEP (SOUTHNAVFACENGCOM, 1993). The tank reportedly received first-floor washing water from the NDI Laboratory's metal cleaning area.

The use of the bead separator continued from 1982 until 1989. Renovation of the north end of Building 313 in 1989 included the abandonment of this system. All of the pipelines leading from the building to the bead separator and from the building to the 4,000-gallon holding tank were disconnected and plugged from within the building. In addition, all liquids in the holding tank were pumped out and transported to an offsite treatment, storage, and disposal facility of treatment (ABB-ES, 1993a).

In March 1993, NAS Cecil Field obtained a modification to permit number 8016-122017. This modification (permit number 8016-211406) stipulated the 4,100-gallon holding tank must be closed in accordance with RCRA by June 4, 1994. A Focused Feasibility Study (FFS) (ABB-ES, 1993a) was prepared prior to the implementation of the IRA to provide remedial action objectives and remedial alternatives. Following the FFS, a Proposed Plan (ABB-ES, 1993b) was prepared and a public meeting was held to present the preferred remedial alternative. The selected remedy was documented in the IROD (ABB-ES, 1994b) dated March 1994. As part of the IRA, the NDI holding tank was excavated on May 11, 1994, and removed from the site on May 17, 1994. In addition, the seepage pit and glass bead separator were also removed. Associated pipes were either removed entirely or partially removed, cut at appropriate locations, and plugged with grout. Approximately 1,579 tons or 1,400 cubic yards of soil contaminated with TCE at concentrations above the IRA action level of 1 milligram per kilogram were excavated and disposed of offsite at a hazardous waste landfill. The area was backfilled with clean fill and restored to its original condition (ABB-ES, 1994a). The total cost of the IRA was $675,000. Details of the IRA can be found in the NDI Holding Tank Closure Certification and Report (ABB-ES, 1994a).

Environmental investigations of the AIMD seepage pit and adjacent areas began in 1985. The following reports describe the results of investigations at OU 7 to date:

- Initial Assessment Study, Envirodyne Engineers, 1985
- RCRA Facility Investigation, Harding Lawson Associates, 1988
- Technical Memorandum for Supplemental Sampling at Operable Units 1, 2, and 7, ABB-ES, 1992.
- Focused Feasibility Study, OU 7, Source Control Remedial Alternatives, ABB-ES, November 1993
- Interim Record of Decision, OU 7, ABB-ES, March 1994
- Non-Destructive Inspection Holding Tank Closure Certification and Report, ABB-ES, September 1994
- Remedial Investigation Report, OU 7, ABB-ES, July 1995
- Baseline Risk Assessment, OU 7, ABB-ES, January 1996
- Feasibility Study, OU 7, ABB-ES, August 1995
- Proposed Plan, OU 7, ABB-ES, March 1996

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION. The results of the remedial investigation (RI) and the baseline risk assessment (BRA) and the remedial alternatives of the feasibility study (FS) were presented to the NAS Cecil Field Restoration Advisory Board (RAB) (composed of community members as well as representatives from the Navy and State and Federal regulatory agencies) on June 8, 1995.

A public meeting was held on March 21, 1996, to present the results of the RI, and the BRA, the remedial alternatives of the FS, and the preferred alternative, and to solicit comments from the community. Comments received during the public meeting are presented in the responsiveness summary in Attachment A. A 30-day comment period was held from March 21 through April 22, 1996. No comments were received during the public comment period.

Public notices of the availability of the Proposed Plan were placed in the Metro section of the Florida Times Union on March 10 and 15, 1996. These local editions target the communities closest to NAS Cecil Field. The Proposed Plan and other documents are available to the public at the Information Repository, located at the Charles D. Webb Wesconnett Branch of the Jacksonville Library, 6887 103rd Street, Jacksonville, Florida.

2.4 SCOPE AND ROLE OF OPERABLE UNIT. As with many Superfund sites, environmental concerns at NAS Cecil Field are complex. As a result, work has been organized into eight installation restoration OUs along with more than 100 other areas undergoing evaluation in the Base Realignment and Closure and underground storage tank programs.

Final RODs have been approved for OUs 1 and 2. An IROD was approved for OU 7 in 1994, which addressed the source area. The other OUs are in various stages of the RI/FS process.

Investigations at OU 7, the subject of this ROD, indicated the presence of soil and groundwater contamination from past disposal practices. The OU 7 interim remedial action addressed soil contamination. The purpose of this remedial action is to remediate groundwater that poses a risk to human health. Ingestion of groundwater extracted from the surficial aquifer poses the principal risk to human health, exceeding the USEPA acceptable risk range.

The following remedial action objective (RAO) was established for OU 7:

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

The remedial action documented in the ROD will achieve this RAO.

2.5 SUMMARY OF SITE CHARACTERISTICS.

Geology. Subsurface geologic materials recovered during drilling operations at OU 7 indicate that the site is underlain by approximately 90 feet of Holocene to Pliocene age fine-grained silty sand. This sand is typically brown to gray throughout and varies in shade from light to dark. Layers of clayey sand, sandy clay, and clay, ranging in thickness from less than an inch to 6 inches, were encountered throughout this lithologic strata. Beneath the sand is a layer of clay containing between 40 percent to 50 percent dolomite fragments. This clay is underlain by dolomite. The dolomite is typically gray, microcrystalline, moderately well cemented, moderately hard to soft, and contains mineral replacement of shell material.

The dolomite is of the Miocene (between 6 and 24 million years old) age Hawthorn Group. Locally, the uppermost layers of the Hawthorn Group include a continuous carbonate-rich unit of dolomite, a limestone or marble rich in magnesium carbonate, and/or shell hash. Historically, this unit has been called the "rock aquifer" or "secondary artesian aquifer." In this report, this unit is simply considered to be a water producing zone of the intermediate aquifer system.

A three-dimensional diagram of the subsurface at OU 7 is presented as Figure 2-3.

Hydrogeology. In the area of investigation, there are three water-bearing systems. In descending order, these are the surficial aquifer (UZS, IZS, and LZS), the intermediate aquifer (UZH), and the Floridan aquifer system. Between each system is an aquitard (less permeable unit). At OU 7, only the surficial aquifer and the top of the intermediate aquifer were investigated.

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The surficial aquifer is unconfined and composed of undifferentiated fine-grained sand with some clayey sand and clay. These sediments extend to approximately 100 feet below land surface (bls) and are underlain by a layer of clay with dolomite fragments. The water table in the surficial aquifer is typically between 5 and 10 feet bls. Groundwater flow in the surficial aquifer is generally to the southeast, toward the wetlands east of the runways, at an average rate of 21 feet per year. At this rate, contaminants from OU 7 would have migrated approximately 735 feet downgradient over the 35 years since wastes were initially released. A pronounced upward gradient is observed before reaching the west side of the runways, beginning approximately 400 feet downgradient of OU 7.

Upgradient of OU 7, the geochemistry of the surficial aquifer is indicative of recharge by rainfall, but downgradient, where the upward gradient is present, the geochemistry is increasingly bicarbonate-rich with depth, to the point of resembling the geochemistry of the intermediate aquifer. This change in geochemistry, along with the upward gradient in the surficial aquifer and widespread upward vertical potential between the intermediate and surficial aquifer, indicates that groundwater is flowing from the intermediate aquifer into the surficial aquifer. It is unclear if this upward migration is due to increased hydraulic conductivity or gaps in the clay layer.

The intermediate aquifer is encountered at OU 7 source area at approximately 105 feet bls. In addition to its clay rich sediments, the Hawthorn includes near its top a locally continuous carbonate rich unit of dolomite with significant secondary porosity. This carbonate-rich unit forms the historical "rock aquifer" or "secondary artesian aquifer," a water-bearing unit widely used in this region as a private drinking water source. In the NAS Cecil Field area, the unit is approximately 20 to 25 feet thick. The top of this unit is irregular and may represent an erosional unconformity. The groundwater flow in the intermediate aquifer at OU 7 is to the south-southeast, toward the wetlands east of the runways, at an average rate of approximately

131 feet per year. A conceptual diagram of the groundwater flow system at OU 7 is presented on Figure 2-4.

The groundwater in the surficial, intermediate, and Floriadan aquifers is potable, class G-II (Florida Legislature, 1990).

Water obtained from the surficial aquifer system is primarily used for lawn irrigation and domestic purposes, including heat exchange units in heating and air conditioning systems. The yield of the wells is typically between 30 and 100 gallons per minute and water use estimates for the surficial aquifer system are approximately 10 to 25 million gallons per day for the city of Jacksonville (Jacksonville Planning Department, 1990a). The surficial aquifer level and flow directions have been altered over time because of increased water use and pumping rates.

The quality of water from the limestone, shell, and sand part of the UZH in the intermediate aquifer system is hard to very hard and has moderate dissolved solids levels. The iron content is variable and some areas contain hydrogen sulfide (Geraghty & Miller, 1985). At least 50,000 homes in the Jacksonville area obtain water from private wells in the UZH. The Florida Department of health and Rehabilitative Services estimates that there are approximately 75 private wells located within a 2-mile radius of NAS Cecil Field and they reportedly produce from within the UZH.

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The Floridan aquifer system is one of the most productive aquifers in the world and is the primary source of water in th Jacksonville area. NAS Cecil Field obtains its potable water from five Navy potable water supply production wells cased in the Floridan aquifer system within the property boundary. These wells are range in depth from 400 to 800 feet bls (NAS Cecil Field, 1990).

Contaminant Sources. At OU 7, the primary source of contamination was the liquid waste generated during the machine and engine parts cleaning process conducted within Building 313. From 1959 to 1980, these wastes were discharged to a holding tank, seepage pit, and bead separator. Based on operations occurring within Building 313 during that time, waste components that had been disposed of may have included sodium cyanide, TCE, creosol, phenol, methylene chloride, and oil (Harding Lawson Associates, 1988).

The seepage pit drained directly to the underlying vadose and phreatic zone soil and groundwater. The addition of wastewater to the seepage pit and eventually to groundwater would be expected to create a localized groundwater mound. The contaminants would most likely have migrated horizontally and vertically within the influence of the mound. When the discharge operations ceased, the mounding would have subsided, leaving contaminants in the vadose zone soil.

After the initial spreading of contaminants caused by the mounding, the contaminants would continue to migrate from the site with the natural flow of groundwater. Contaminants remaining within the initial mound area (in soil both above and below the water table) could serve as a continuing source of groundwater contamination.

Surface Soil Analytical Results. The results of the confirmatory surface soil sampling program (initiated after the IRA) indicated the presence of volatile organic compounds (VOCs) (TCE and its transformation product 1,2-dichloroethene [DCE]), semivolatile organic compounds (SVOCs) (polynuclear aromatic hydrocarbon [PAHs]), pesticides and polychlorinated biphenyls (PCBs), and inorganics. As detected, these compound in surface soil are randomly distributed and are not believed to have been introduced by the subsurface discharge from the seepage pit. Those compounds present in surface soil that may be associated with the discharge, such as TCE, appear to have been randomly introduced to the surface soil during IRA excavation activities.

The BRA (ABB-ES, 1996a) indicates that the compounds detected in surface soil do not pose a risk to human receptors. Ecological risk was not assessed for surface soil due to the industrial setting of OU 7.

The distribution of surface soil contamination is shown on Figures 2-5 and 2-6.

Subsurface Soil Analytical Results. The results of the confirmatory subsurface soil sampling program indicate the presence of VOCs, SVOCs, pesticides, PCBs and inorganics. The VOCs, SVOCs, and inorganics appear to be related to the past discharge as they are detected at highest concentrations near the former seepage pit area. Pesticides and PCBs were detected at locations that had a more sporadic distribution across the site. The VOCs detected included TCE and 1,2-DCE as well as methylene chloride, 2-butanone, and acetone (common laboratory artifacts). The SVOCs detected included PAHs, phthalates, and phenol. The inorganics detected most frequently and exceeding background screening concentrations were aluminum, calcium, cobalt, and magnesium. Cadmium, cobalt, thallium, and zinc were detected in the subsurface soil samples at the site but not in the background data set.

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<IMG SRC 0496271M>

The BRA (ABB-ES, 1996a) indicate that the compounds detected in the subsurface soil do not pose an unacceptable risk to human receptors. Ecological risk was not assessed for subsurface soil due to the industrial setting of OU 7.

The distribution of subsurface soil contamination at OU 7 is shown on Figures 2-7 and 2-8.

Groundwater Surficial Aquifer. VOCs, SVOCs, and inorganics were detected in samples collected from the surficial aquifer at OU 7. The VOCs (1-1-DCE, 1,2-DCE, 1,1,1-trichloroethane, and TCE) and inorganics (aluminum, cadmium, cobalt, lead, sodium, and vanadium) appear to be associated with th source area.

The groundwater analytical results indicate that contaminants, primarily TCE, extend radially outward approximately 60 feet and downward approximately 65 feet from the source area.

The leading edge of this contamination has migrated approximately 1,000 feet downgradient from the seepage pit area in the 35 years since discharge of wastewater from Building 313 began.

The BRA (ABB-ES 1996a) indicate that three of the organic compounds detected in groundwater samples from the surficial aquifer and associated with the source (TCE, 1,2-DCE, and 1,1-DCE) pose a risk (if groundwater is used as a potable water source) to human receptors. No organic compounds detected in groundwater pose a current risk to ecological receptors and only bis(2-ethylhexyl)phthalate poses a future risk (to aquatic receptors in the wetlands).

The BRA (ABB-ES, 1996a) indicate that none of the inorganics detected in the surficial aquifer samples and associated with the source pose a risk to human receptors, and only aluminum, iron, and zinc pose a future risk (upon discharge to wetlands) to ecological receptors.

Intermediate Aquifer. TCE was not detected in samples from the intermediate aquifer.

SVOCs and inorganics were detected in samples collected from the intermediate aquifer, but these detections are not believed to be associated with OU 7 because groundwater flows from the intermediate aquifer upward to the surficial aquifer.

The distribution of groundwater contamination is shown on Figures 2-9 and 2-10.

Surface Water and Sediment. Surface wate and sediment samples were collected from drainage ditches east of the north-south runways. These ditches receive drainage from the runways and the developed area west of the runways, including OU 7. VOCs, SVOCs, and inorganics were detected in surface water and sediment samples from the drainage ditches.

Evaluation of the surface water results indicated that the TCE and 1,2-DCE detected at location STCSW3 appear to be associated with OU 7. The storm-sewer line that discharges to this location runs along the west side of Building 313 and through the TCE-contaminated groundwater plume southeast of OU 7. The invert of the storm-sewer line is below the water table, and dry weather flow has been observed. This may indicate that groundwater is entering the system through joints or cracks. TCE was detected in several water samples collected from catch basins along the storm-sewer line. The TCE detections in the storm-sewer line and in the drainage ditch beyond its outfall may be the result of TCE-contaminat- ed groundwater from OU 7 entering the line. However, the BRA (ABB-ES, 1996) indicates that none of these surface water contaminants pose a risk to ecological receptors.

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<IMG SRC 0496271O>
<IMG SRC 0496271P>
<IMG SRC 0496271Q>

The only risk to aquatic receptors may be associated with elevated concentrations of total recoverable petroleum hydrocarbons (TRPH) in sediment. Because the ditches receive stormwater drainage from the runway area and much of the developed area west of the runways, the presence of TRPH in the sediment is not believed to be related to OU 7.

Sample results are presented on Figures 2-11 and 2-12.

2.6 SUMMARY OF SITE RISKS. The baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by remedial action. It serves as the baseline indicating what risks could exist if no action were taken at the site. This section of the ROD reports the results of the baseline risk assessment conducted for OU 7. This risk assessment identified human health and ecological risks at OU 7.

Human Health Risk Assessment (HHRA) The purpose of the HHRA was to characterize the risks associated with possible exposures to site-related contaminants for human receptors. Potential health risks were evaluated under current and assumed future land-use conditions for a subset of contaminants detected in surface soil, subsurface soil, surface water, sediment, and groundwater (surficial and intermediate aquifers).

Under current land use, estimated cancer and noncancer risks are considered acceptable according to the NCP. The NCP establishes "acceptable" as the excess lifetime cancer risk, due to exposure to the human health chemicals of potential concern at a site by each complete exposure pathway, of 1 in a million to 1 in 10,000 (USEPA, 1990) or a noncancer hazard index (HI) of equal to or less than 1.

For the HHRA, the assumed future land use for OU 7 is residential, including use of groundwater at OU 7 as a potable water supply (ingestion of groundwater and inhalation of VOCs by an adult resident while showering). Cancer and noncancer risk under these assumed conditions in surface soil, subsurface soil, surface water, sediment, and the intermediate aquifer are consistent with USEPA acceptable risks. The calculated risks for the surficial aquifer exceed USEPA acceptable risks. The cancer risk estimate for the surficial aquifer under the assumed use of groundwater as a potable water supply is 3 in 1,000. The major contaminant contributing to the cancer risk is 1,1-DCE. The noncancer risk estimate (HI) for the surficial aquifer (adult resident) is 50. Major contributors to this HI are 1,2-DCE, 1,1- DCE, TCE, antimony, and thallium.

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<IMG SRC 0496271S>

Because the current base reuse plan indicates that OU 7 will continue to be used for industrial purposes and because the buildings adjacent to OU 7 are served with a potable water supply, the estimated future risks may never occur.

A summary of the cancer and noncancer risks from consumption of OU 7 groundwater is presented in Table 2-1

Table 2-1 Cancer and Noncancer Risks Posed by Domestic Use of OU 7 Groundwater to an Adult Resident

Record of Decision Operable Unit 7, NAS Cecil Field Jacksonville, Florida

Chemical	Maximum Concentration µg/l	Total Cancer Risk1 (Percent of Total)	Total Noncancer Hazard Index2 (Percent of Total)
Trichloroethene	630	8.1 x 10-5 (2.6%)	2.9 (6.2%)
1,1 Dichloroethene	400	2.8 x 10-3 (90.2%)	1.2 (2.5%)
1,2 Dichloroethene	12,450	NA	38 (81.8%)
Bis (2-Ethylhexyl)phthalate	10.2	1.7 x 10-6 (<1%)	1.4 x 10-2 (<1%)
Aluminum	7970	NA	2.2 x 10-1 (<1%)
Antimony	3.5	NA	1.1 (2.3%)
Arsenic	10.8	2.2 x 10-4 (7.1%)	9.9 x 10-1 (2.1%)
Cobalt	5.9	NA	9.0 x 10-4 (<1%)
Manganese	46.1	NA	2.5 x 10-1 (<1%)
Thallium	5.4	NA	1.8 (3.8%)
Total Route-Specific Cancer and Noncancer Risk:		3.0 x 10-3	50

1 Cancer risk values are rounded to two significant figures. Percent was calculated before rounding. [2] Hazard index values are rounded to two significant figures. Percent was calculated before rounding. Example: 2 X 10-4 is equal to 2 in 10,000.

Notes: OU = operable unit. NAS = Naval Air Station. µg/l = micrograms per liter. % = percent of total risk or hazard. NA = not applicable. < = less than.

Ecological Assessment The purpose of the ecological risk assessment was to characterize the risks associated with potential exposures to site-related contaminants at OU 7 for ecological receptors. Potential risks for ecological receptors were evaluated for selected contaminants detected in surface water, sediment, and groundwater at OU 7.

Sediment toxicity testing results indicate that risks may be present for certain types of macroinvertebrate receptors at two of the three sampling stations from within the drainage ditches. Comparison of the adverse responses with the measurements of selected contaminants in surface water or sediment revealed that risks to aquatic receptors may be associated with elevated concentrations of TRPH in sediment. TRPH was not identified as a contaminant associated with OU 7 but is expected to have entered the storm sewers as a result of fuel spills or runoff from runways and parking lots.

Risks were not identified for terrestrial wildlife resulting from exposures to selected contaminants in surface water and sediment within the drainage ditches.

Potential risks for aquatic receptors were evaluated for exposures to selected contaminants in groundwater. The maximum concentrations of selected contaminants in unfiltered groundwater, as they are discharged to both the wetlands and Sal Taylor Creek, were estimated. The risk characterization did not identify risks for aquatic receptors in Sal Taylor Creek that could be associated with exposures to selected contaminants in groundwater. However, future risks associated with exposures to bis(2-ethylhexyl)phthalate, aluminum, iron, and zinc are possible for aquatic receptors within the wetlands. Although bis(2-ethylhexyl)phthalate and zinc pose a future risk to ecological receptors, their source can not be hydraulically linked to the OU 7 source area.

A summary of the ecological risk assessment for OU 7 is presented in Table 2-2.

Table 2-2 OU 7 Ecological Risk
Assessment Summary

Record of Decision Operable Unit7,
NAS Cecil Field Jacksonville, Florida

Medium
Receptor Future Groundwater Surface Soil Surface Water
Sediment Discharge Terrestrial and wetland wildlife NE None
None NA Terrestrial plant NE NA
NA NA Soil invertebrate NE
NA NA NA Benthic macroinvertebrates NE None
TRPH1 BEP, Al, Fe, Zn[2]

1 Drainage ditch only, but TRPH cannot be linked to OU 7. [2] Wetlands only.

Notes: OU = operable unit. NAS = Naval Air station. NE = not evaluated (industrial setting, no receptors). None = no effect. NA not applicable. TRPH = total recoverable petroleum hydrocarbon. BEP = bis(2-ethylhexy)phthalate. Al = aluminum. Fe = iron. Zn = zinc.

2.7 DESCRIPTION OF ALTERNATIVES. This section provides a narrative of each alternative evaluated for groundwater at OU 7. A detailed assessment of each alternative is presented in Table 2-3. Contaminated soil was addressed during the IRA, which was the final action for soil at the site. For further information on the remedial alternatives, see the FS (ABB-ES, 1995b).

2.7.1 Groundwater Alternatives Analyzed Six groundwater alternatives have been developed to address groundwater contamination a OU 7. Groundwater alternatives evaluated include 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; and MM-6, a combination of MM-2 and MM-5.

Table 2-3 Remedial
Alternatives for OU 7 Groundwater

Record of Decision Operable
Unit 7, NAS Cecil Field
Jacksonville, Florida

Alternatives MM-1 No Action , MM-2 Enhanced MM-3 Groundwater Ex- MM-4 Sparging of MM-5 Groundwater Preferred Alternative: Bioremediation traction, Treatment, and Groundwater Extraction, Pretreatment, MM-6
(Combination of Discharge to Surface and
Discharge to a MM-2 and MM-5)
Water Wastewater Treatment Plant

Activities ! Groundwater moni- ! Encourage growth of ! Groundwater
extrac- ! Air injected into ! Groundwater extrac- !
See MM-2 and toring. microscopic organ- tion.
groundwater through tion. MM-5 ! Groundwater-use
isms. ! Treatment to wells. !
Organics transferred restrictions. ! Groundwater monitor-
include ! Vaporized organics from groundwater to ! 5-year
view. ing. - pH adjustment, extracted from
soil. air in an enclosed air ! Biodegradation moni- -
UV/OX, ! Vaporized organics stripping unit.
toring. - polymer addition treated to destroy
! Air treated prior to ! Groundwater-use re- and
clarification, and contaminants. release to the
strictions. - GAC adsorption. ! Groundwater and
atmosphere. ! 5-year reviews. ! Treated groundwater
treatment system ! Treated groundwater discharged to surface
monitoring. discharged to a water. !
Groundwater-use wastewater treatment ! Groundwater and ex-
restrictions. plant. traction/treatment sys- ! 5-year
reviews. ! Groundwater and ex- tem monitoring.
traction/treatment sys- ! Groundwater-use re- tem monitoring.
strictions. ! Groundwater-use re- ! 5-year reviews.
strictions. ! 5-year reviews.

Estimated Cost $524,000 $2,256,000 $5,732,000 $1,829,000 $3,672,000 $2,916,000 (present worth, 30 years)

Time (to reduce > 100 years 12 years 30 years 12 years $30 years 5 to 12 years risk due to COPC)

Time (to > 100 years > 100 years 30 years > 100 years 30 years 30 to 100 years achieve ARARs)

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

MM-1 No Action. Evaluation of the no action alternative is required by law. This alternative will leave the site the way it exists today. Site conditions would be reviewed once every 5 years, and future remedial actions would not be prevented. No residuals would be generated if this alternative were chosen.

This alternative would not comply with chemical-specific ARARs in the short-term. Eventually, through naturally occurring processes such as natural attenuation, this alternative may achieve chemical-specific ARARs.

Capital costs to implement MM-1 are $0. The present worth of operations and maintenance costs (monitoring of groundwater) for 30 years is $524,000.

MM-2 Enhanced Bioremediation. This alternative consists of (1) the enhancement of natural biological degradation processes to reduce contaminant concentrations in groundwater and (2) 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. Nutrients would be injected into an estimated nine injection wells over a 12-year period. Groundwater quality monitoring and 5-year progress review would also be conducted for a period of 30 years. No treatment residuals would be generated if this alternative were chosen.

In the short-term, this alternative would not achieve chemical-specific ARARs. This alternative would eventually achieve chemical-specific ARARs for VOCs and SVOCs through natural and enhanced biological mechanisms. This alternative would not reduce the concentrations of inorganic constituents such as aluminum, antimony, arsenic, manganese, and thallium. Groundwater and biological monitoring will be used to model biological degradation to evaluate compliance with ARARs.

Action-specific ARARs, such as Florida underground injecton control regulations, would need to be met by the alternative.

The estimated time of operation for this alternative is 12 years. The estimated present worth total cost is $2,256,000.

MM-3 Groundwater Extraction, Treatment, and Discharge to Surface Water. Alternative MM-3consists of pumping contaminated groundwater out of the ground for treatment. It is estimated that six extraction wells may be necessary. The extracted groundwater would be treated with ultraviolet light and an oxidant, such as hydrogen peroxide, which would destroy contaminants. The residuals generated through this treatment process include sludge from the clarification process and spent carbon from the adsorption process. 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 contminant removal was occurring. Groundwater quality monitoring and 5-year progress reviews would be conducted for a 30-year period.

This alternative would achieve ARARs.

The estimated present worth total cost is $5,732,000 over 30 years of operation.

MM-4 Sparging of Groundwater. This alternative involves forcing air through injection wells (estimated 10 air injection wells) into groundwater and removing organic contaminants by changing them into gas through volatilization. This gas is extracted through vapor extraction wells (estimated 14 extraction wells) where air within the dry soil above the water table is extracted and passed through a granular activated carbon filter to remove organic contaminants. The clean air is then released to the atmosphere. The carbon filter containing the contami- nants is taken offsite for treatment or disposal.

In the short-term, this alternative would not achieve chemical-specific ARARs. This alternative would eventually achieve chemical-specific ARARs for VOCs such as 1,1,1-TCA, 1,1-DCE, 1,2-DCE, and TCE and SVOCs such as bis(2-ethylhexyl)phthalate through air sparging. However, this alternative would not increase the rate of achieving chemical-specific ARARs for inorganic contaminants such as aluminum, antimony, arsenic, manganese, and thallium. Groundwater and biological monitoring will be used to evaluate biological degradation and compliance with ARARs.

Air sparging would occur for 12 years. Groundwater quality monitoring and 5-year progress reviews would be conducted for a 30-year period. The estimated present worth total cost is $1,829,000 over 30 years.

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 (through an estimated six extraction wells), 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 TCE will need to be removed from groundwater prior to discharge to the wastewater treatment plant. MM-5 relies on the existing wastewater treatment plant for treatment of other chemicals before discharge to surface water. The only residuals generated through this treatment process would be spent carbon from the treatment of air in the air stripping process.

This alternative would comply with ARARs.

The estimated present worth total cost is $3,672,000 over 30 years.

MM-6 Enhanced Bioremediation (MM-2) and Groundwater Extraction, Pretreatment, and Discharge to a Wastewater Treatment Plant (MM-5). This alternative is a combination of MM-2 and MM-5. MM-5 would be installed in the area of highest contaminant concentrations (the source area). This treatment method, extraction of groundwater through one well, followed by treatment via air stripping and discharge to the wastewater treatment plant, would remove and treat the majority of the contaminant plume in the source area. Away from the source area (i.e. the downgradient area), MM-2 would be installed to treat contaminants. In this area, air would be injected through three injection wells to promote aerobic degradation of organic contaminants. These chemicals would be broken down to harmless substances; additionally, air would be extracted through an estimated eight vapor extraction wells and treated prior to discharge to the atmosphere.

The only residual generated through this process would be spent carbon from the treatment of air via carbon adsorption.

This alternative would comply with ARARs.

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.

2.8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES. This section evaluates and compares each of the alternatives with respect to the nine criteria outlined in Section 300.430(s) of the NCP. These criteria are categorized as threshold, primary balancing, or modifying. Table 2-4 gives an explanation of the evaluation criteria.

A detailed analysis was performed on the alternatives using the nine evaluation criteria to select a site remedy; Table 2-5 presents this comparison. Also, Table 2-6 provides a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria.

2.9 SELECTED REMEDY. MM-6 (a combination of MM-2 and MM-5) was selected as the preferred alternative for OU 7 at NAS Cecil Field. This alternative would involve the implementation of MM-5 in the source area until the remediation action levels are met. The remediation action levels were based on Federal Maximum Contaminant Levels, Florida Groundwater Guidance Concentrations, and NAS Cecil Field background groundwater concentrations. Here, groundwater would be extracted through one extraction well (thus achieving the action levels presented on Table 2-7 in the source area) and pretreated via air stripping and discharged to the facility's Wastewater Treatment Plant. The pretreatment process would achieve the treatment levels presented in Table 2-8. This source area treatment would address both organic and inorganic chemicals in the source area groundwater.

This alternative would also involve the implementation of MM-2 in the downgradient area of the OU 7 plume. Here, nutrients would be injected to the subsurface through three injection wells to promote aerobic degradation of organic contaminants. Additionally, an estimated eight vapor extraction wells will be installed to extract air from the subsurface for treatment. It is anticipated that action levels (Table 2-7) for organic chemicals in the downgradient area of the plume would be achieved within 12 years. Action levels for inorganic chemicals in the downgradient area of the plume would not be achieved, however, the concentrations of inorganics are not as high in the downgradient area of the plume as they are in the upgradient area of the plume.

Operation and maintenance for the preferred remedy includes the sampling and analysis of in situ groundwater, treated groundwater, and residuals from the various treatment processes. The site will be reviewed by the regulatory agency every 5 years. If, at the 5-year review period, concentrations of organic and inorganic chemicals are not decreasing, recommendations for the installation of additional extraction wells, or alternative treatment technologies may be made.

Table 2-4 Explanation of Evaluation Criteria

Record of Decision Operable Unit 7, NAS Cecil Field Jacksonville, Florida

! 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 that have been 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 on the basis of how it reduces the harmful nature of the contaminants, its ability to move through the environment, and the amount of contamination.
	Short-term Effectiveness. This criterion assesses the risks that implementation of a particular remedy may pose to workers and nearby residents (e.g., whether or not contaminated dust will be produced during excavation), as well as the reduction in risks that result by controlling the contaminants. The length of time needed to implement each alternative is also considered.
	Implementability. The technical feasibility and administrative ease (e.g., the amount of coordina- tion with other government agencies that is needed) or a remedy, including availability of neces- sary goods and services, is assessed.
	Cost. The benefits of implementing a particular alternative are weighed against the cost of im- plementation.
Modifying	U.S. Environmental Protection Agency (USEPA) and Florida Department to 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.

Note: NAS = Naval Air Station.

Tab
2-5 Comparative
Summary of Source
Control Remedial
Alternatives for OU 7

Opera
Unit
7,
NAS
Cecil
Field
Jacks
Flori

Alternative Threshold Criteria Primary Balancing Criteria

Overall Protection of Compliance Long-term
Toxicity, Short-term Human Health and the
with ARARs Effectiveness and Mobility, and Effectiveness
Implementability Cost Environment Permanence
Volume

Alternative Risks to human health This alternative This
alternative pro- Reduction in toxici- This alternative The
no action alter- $524,000 MM-1: would be controlled would not
meet vides no further pro- ty of VOCs and provides no reme-
native would be No Action through GW-use restric- chemical-specific
tection of human SVOCs would occur dial response ac- easy to
implement. tions. Risks to the envi- ARARs such as health and
the envi- through natural tion and, therefore, This
alternative ronment would not be MCLs or FGCs in ronment over
current degradation. How- would not adverse- would not
interfere controlled, however, no the short-term. conditions.
Natural ever, reduction in - ly impact the com- with the
ability to short-term or cross media However, this al- degradation of
con- mobility and vol- munity or the envi- perform future effects are
anticipated. ternative may taminants in GW ume of
contami- ronment during remedial actions. comply with
may require up to nated GW would implementation. ARARs through
160 years to achieve not occur because natural attenuation action
levels. this alternative does in the long-term.
not treat GW.

Alternative Risks to human health This alternative This
alternative pro- This alternative This alternative is
Alternative MM-2 $2,256,000 MM-2: would be controlled would not
meet vides a permanent would accelerate not expected to
would be easy to Enhanced through GW-use restric- chemical-specific
and long-term reme- reduction in the have an impact on implement.
Imple- Bioremediat- tions until VOCs and ARARs such as dy for GW
contami- toxicity of VOCs the community mentaion of the ion

SVOCs are reduced or MCLs or FGCs in nation, thus protect- and
SVOCs, howev- during implement- alternative would eliminated. Risks to
the the short-term. ing human and eco- er, no significant
re- tation because not provide addi- environment would not be
However, this al- logical receptors. duction in mobility
construction activi- tional risks to hu- controlled by in situ treat-
ternative may Enhanced degrada- and volume would ties are
limited to man health or eco- ment, however, no short- comply with
tion of contaminants be achieved. well installations logical
receptors term or cross media ef- ARARs through may require up
to 12 and all treatment over baseline
con- fects are anticipated. natural and en- years to achieve
ac- would occur in ditions. hanced
biodegra- tion levels. situ. dation in the long- term.

See notes at end of table.

Table 2-5 (Continued)
Comparative Summary of
Source Control Remedial
Alternatives for OU 7

Opera
Unit
7,
NAS
Cecil
Field
Jacks
Flori

Alternative Threshold Criteria Primary Balancing Criteria

Overall Protection of Compliance Long-term
Toxicity, Short-term Human Health and the
with ARARs Effectiveness and Mobility, and Effectiveness
Implementability Cost Environment Permanence
Volume

Alternative Risks to human health This alternative This
alternative pro- This alternative Installation of ex-
Implementation of $5,732,000 MM-3: would be controlled re-
would meet all vides a permanent would reduce the traction
wells and Alternative MM-3 Groundwater duced, and eliminated ARARs.
and long-term reme- toxicity, mobility, treatment equip- would
require Extraction, through GW extraction, dy for GW contaimi- and
volume of ment would not more equipment to Treatment,
treatment and GW-use re- nation, thus protect- VOC, SVOC, and
pose a significant construct than and strictions. Risks to the ing
human and eco- inorganic contami- risk to workers or other
alternatives. Discharge to environment would be logical receptors.
nants in extracted the community. In addition, the Surface Water
controlled by extraction Extraction and GW GW.
This alternative treated effluent and treatment of contami- treatment via
UV/OX would achieve would be dis- nated GW.
No short-term and GAC may re-
RAOs in the short- charged to surface or cross media effects are
quire up to 30 years term because GW
water via storm anticipated to
achieve action lev- would be collected drains. The
efflu- els. and treated. ent must meet
NPDES require- ments.

Alternative Risks to human health This alternative This
alternative pro- This alternative This alternative Alternative
MM-4 $1,829,000 MM-4: would be controlled would not meet
vides a permanent would accelerate would achieve would be
easy to Sparging of through GW-use restric- chemical-specific and
long-term reme- toxicity, mobility RAOs in the short- implement.
Imple- Groundwater tions until VOCs and ARARs such as dy for GW
contami- and volume of VOC term because vola- mentation of the
SVOCs are reduced or MCLs or FGCs in nation, thus protect-

and SVOC contami- tilization and gas   alternative would eliminated. Risks
to   the short-term.   ing human and eco-   nants through
vola- transfer of contami-   not provide addi- environment would not be
However, this al-   logical receptors. Air   tilization of dissol- nants
is a rapid   tional risks to hu- controlled by in situ treat- ternative
may   sparging with SVE   ved contaminants. treatment process.
man health or eco- ment, however, no short- comply with   may
require up to 12 Installation of spar-   logical receptors term or cross media
ef-   ARARs through air   year to achieve ac-
ging and extraction   over baseline con- fects are anticipated.
injection, vapor ex-   tion levels.
well and treat-   ditions. traction and treat- ment equipment ment in
the long- would not pose a term. significant risk to workers or the co-
mmunity.

See notes at end of table.

Table 2-5 (Continued)
Comparative Summary of
Source Control
Remedial Alternatives
for OU 7

Opera
Unit
7,
NAS
Cecil
Field
Jacks
Flori

Alternative Threshold Criteria Primary Balancing Criteria

Overall Protection of Compliance Long-term
Toxicity, Short-term Human Health and the
with ARARs Effectiveness and Mobility, and Effectiveness
Implementability Cost Environment Permanence
Volume

Alternative Risks to human health and This alternative This
alternative pro- This alternative Installation of ex-
Alternative MM-5 $3,672,000 MM-5: the environment would be
would meet all vides a permanent would reduce the traction
wells and would be similar to Groundwater controlled, reduced, and
ARARs. and long-term reme- toxicity, mobility,
treatment equip- alternative MM-3, Extraction, eliminated through GW
ex- dy for GW contaimi- and volume of
ment would not however, the dis- Pretreat- traction, treatment
and nation, thus protect- VOC, SVOC, and
pose a significant charge of the treat- ment and GW-use
restrictions. No ing human and eco- inorganic contami- risk
to workers or ed effluent would Discharge short-term or cross media
logical receptors. nants in extracted the community. be
discharged to to FOTW effects are anticipated. Extraction and GW
GW. This alternative the FOTW instead treatment via
air would achieve of surface
water. stripping and GAC RAOs in the short- may require up to 30
term because GW years to achieve ac- would be
collected tion levels. and treated.
Alternative Risks to human health and This alternative This
alternative pro- This alternative This concentrations The
treatment $2,916,000 MM-6: the environment would be would
meet all vides a permanent would reduce the or organic and
methods proposed Combination controlled, reduced, and ARARs.
and long-term reme- toxicity, mobility inorganic contami- for the
preferred of Alter- eliminated by: GW extrac-
dy for GW contami- and volume of nants in the source alternative
have tives MM-2 tion and treatment in the
nation. Enhanced VOC, SVOC, and area would be been
successfully and MM-5 source area; enhanced bioremediation com-
inorganic contami- reduced almost implemented at bioremediation

bined with extraction nants in extracted immediately. This
other sites. downgradient of the and GW
treatment GW and downgrad- alternative would source area; and
GW-use would require 5 to 30 lent via in situ bio- achieve CAOs in
restrictions. No short-term years to achieve ac-
remediation. the short-term. or cross media effects are tion
levels. anticipated. See notes at end of table.

Table 2-5 (Continued)
Comparative Summary of
Source Control
Remedial Alternatives
for OU 7

Notes: OU = operable unit. NAS = Naval Air Station. ARARs = Applicable or Relevant and Appropriate Requirements. GW = groundwater. MCL = Maximum Contaminant Level. FGCs = Florida Groundwater Guidance Concentrations. VOCs = Volatile Organic Compounds. SVOCs = Semi-volatile Organic Compounds. UV/OX = Ultraviolet/Oxidation. GAC = Granular Activated Carbon. RAOs = Remedial Action Objection. NPDES = National Pollutant Discharge Elimination System.

Table 2-6 Summary of Comparative Analysis

Record of Decision Operable Unit 7, NAS Cecil Field Jacksonville, Florida

Alternative:	MM-1	MM-2	MM-3	MM-4	MM-5	MM-6
Aquifer Restoration						
Organics destroyed?	No	Yes	Yes	Yes	Yes	Yes
Inorganics removed from	No	No	Yes	No	Yes	Yes aquifer?
Estimated time to achieve	100+	12 to 100+	30	12 to 100+	30	12 to action levels (years) 100+
Plume contained?	No	No	Yes	Partially	Yes	Yes
Plume toxicity reduced?	No	Partially	Yes	Partially	Yes	Yes
Remedy permanent?	No	Yes	Yes	Yes	Yes	Yes
Uncertainty of attaining	Moderate	Moderate	Low	Moderate	Low	Low action levels
Treatment Residuals						
Organics destroyed onsite	No	Yes	Yes	No	No	Yes
Organics destroyed offsite	No	NA	NA	Yes	Yes	Yes
Contaminants Released/Remaining in Environment						
Organic	Yes	No	No	No	No	No
Inorganics	Yes	Yes	No	Yes	No	Yes
Cost						
Present worth (30 year)	524,000	2,256,000	5,732,000	1,829,000	3,672,000	2,916,000

Notes: NAS = Naval Air Station.
MM-1 = no action alterative.
MM-2 = enhanched bioremediation alternative.
MM-3 = groundwater extraction, treatment, and discharge to suface water alternative.
MM-4 = sparging of groundwater alternative.
MM-5 = groundwater extraction, pretreatment, and discharge to federally owned treatment works alterntive.
MM-6 = preferred alternative. NA = not applicable. 100+ = greater than 1-00 years.

Table 2-7 Action Level Summary

Record of Decision Operable Unit 7, NAS
Cecil Field Jacksonville, Florida

Remediation Analyte	Frequency Detection[1]	Range of Detected Concentrations	Mean of Detected Concentrations[2]	Maximum Detected Concentration	Action Levels
Volatile Organic Compunds (µg/l)					
1,1,1-Trichloroethane	1/21	3,000	3,000	3,000	3,4200
1,1-Dichloroethene	1/21	400	400	400	3,47
1,2-Dichloroethene (total)	2/21	270 to 12,500	6,360	12,500	3,470
Tichloroethene	7/21	12 to 630	238	630	33
Inorganic Analytes (µg/l)					
Aluminum	12/21	176 to 7,970	1,480	7,970	5750
Antimony	3/21	2.2 to 16.0	7.3	16.0	3,46
Arsenic	10/21	3.6 to 56.2	13.2	56.2	3,450
Manganese	18/20	4.9 to 56.8	27.4	56.8	3,450
Thallium	3/21	6 to 6.3	6.2	6.3	3,42

1 Frequency of detection is the number of confirmatory samples in which the analyte was detected divided by the total number of confirmatory samples analyzed.
2 The average of detected concentrations is the arithmetic mean of all confirmatory samples in which the analyte was detected. It does not include those confirmatory samples in which the analyte was not detected.
3 Florida Groundwater Guidance Concentrations; taken from Chapters 1 and 2 (Primary and Secondary Standards) of the Florida Department of Environmental Protection Groundwater Guidance Concentrations (June 1994).
4 Federal Maximum Contaminant Levels; taken from U.S. Environmental Protection Agency Drinking Water Regulations an Health Advisories (May 1994).
5 NAS Cecil Field background groundwater concentration; represents the mean of the detected chemicals in four background (upgradient) monitoring wells at OU 7 (CEF-16-13S, CEF-16-14D, CEF-16-15S, and CEF-16-16D).

Notes: NAS = Naval Air Station.
µg/l = micrograms per liter.
OU = operable unit.

Table 2-8
Groundwater Pretreatment Requirements for Discharge
to Federally Owned Treatment Work (FOTW)

Record of
Decision Operable
Unit 7, NAS Cecil
Field Jacksonville,
Florida Estimated
Percent Pretreatment
Frequency Range
of Mean of
Concentration FOTW
Overall Percent
Removal Percent
Analyte of
Detected Detected
in Extracted
Discharge Removal
Achievable by Removal
Detection1
Concentrations
Concentrations[2]
Groundwater3
Criteria4 Required5
FOTW6 Required7

Volatile Organic Compounds (µg/l)

1,1-Dichloroethene 1/21 400 to 400 400 33
3.2 90.2 90.6 NA Trichloroethene
7/21 12 to 630 238 821,800 80.7 99.6
73.1 98.6

Semivolatile Organic Compounds (µg/l)

Phenanthrene 1/21 3 3 0.06
0.03 50.0 84.1 NA bis(2-Ethylhexyl)
17/21 0.5 to 20.5 5.7 5.7 3 47.4
99.9 NA phthalate

Inorganic Analytes (µg/l)

Copper 5/21 2.1 to 3.8 3

3.8 2.9 22.7 61.7 NA Iron
20/20 260 to 9,150 1,828 1,900 300
84.2 75.3 36.0 Nickel 2/21 11 to 12.5
11.8 11.5 8.3 27.8 49.8 NA
Thallium 3/21 6 to 6.3 6.2
8.8 6.3 28.0 80.0 NA

1 Frequency of detection is the number of confirmatory samples in which the analyte was detected divided by the total number of samples analyzed (confirmatory samples only). 2 The average of detected concentrations is the arithmetic mean of all confirmatory samples in which the analyte was detected. It does not include those sample in which the analyte was not detected. 3 Estimated contaminant concentrations in extracted groundwater are provided in Appendix C and the calculations are presented in Appendix D. 4 Discharge criteria that the FOTW must meet (Florida Surface Water Standards). 5 Percent removal required for extracted groundwater to meet the FOTW discharge criteria. 6 Percent removal able to be achieved by the FOTW (predicted using the U.S. Environmental Protection Agency [USEPA] Fate and Treatability Estimator [FATE]) Model, 1989). 7 Percent removal required for pretreatment prior to discharge to FOTW (where NA, the FOTW can provide the percent removal necessary). 8 Value estimated from confirmatory and screening data.

Notes: µg/l = micrograms per liter. NA = not available.

2.10 STATUTORY DETERMINATIONS. The remedial alternatives selected for OU 7 are consistent with CERCLA and the NCP. The selected remedy provides protection of human health and the environment, attains ARARs, and is cost-effective. Tables 2-9 through 2-11 list and describe Federal and State ARARs to which the selected remedy must comply. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. The selected remedy also provides flexibility to implement additional remedial measures, if necessary, to address RAOs or unforeseen issues.

2.11 DOCUMENTATION OF SIGNIFICANT CHANGES. The proposed plan for OU 7 was released for public comment in March 1996. The proposed plan identified Alternative MM-6, combined enhanced bioremediation and groundwater extraction pretreatment, and discharge to a wastewater treatment plant, as the preferred alternative for groundwater remediation. Public comments on the proposed plan are presented in Attachment A, Responsiveness Summary. No significant changes to the remedy, as originally identified in the proposed plan, were necessary.

Consideration in the Remedial Standards and Requirements
Synopsis Response Process

Federal

Endangered Species Act [50 CFR Part 402] Requires remedial action to avoid
jeopardizing the continued While implementing the preferred alternatives,
impact to existence of federally listed endangered or threatened species.
endangered species existing in and around OU 7 will be Requirements include
notification to the USEPA and minimized. minimization of adverse
effects to such endangered species.

State

Chapter 62-340, FAC, Delineation of the Provides a unified statewide
methodology for delineation of Applicable. The methodology defined in
this rule is Landward Extent of Wetland and Suface wetland and surface
waters. required for delineation of all wetland and surface waters Waters
at OU 7.

Notes: ARARs = applicable and/or relevant and appropriate requirements. NAS =
Naval Air Station. CFR = Code of Federal Regulations. USEPA = U.S.
Environmental Protection Agency. OU = operable unit. FAC = Florida
Administrative Code.

T
2-10 Synopsis of Potential
Federal and State
Chemical-Specific ARARs

Consideration in the Remedial Standards and Requirements
Synopsis Response Process

Federal

Safe Drinking Water Act (SDWA) Establishes drinking water quality
goals at levels of no known MCLs and nonzero MCLGs were considered when
identifying Regulations, Maximum Contami- or anticipated adverse
health effects with an adequate margin action and treatment levels.
nant Level Goals (MCLGs) [40 CFR of safety. These criteria do not
consider treatment feasibility of Part 141]
cost elements.

SDWA Regulations, National Prima- Establishes enforceable standards
for potable water distribu- ry Drinking Water Standards, Maxi- tion
systems for specific contaminants that have been deter- mum Contaminant Levels
(MCLs) mined to adversely affect human health. These standards.
[40 CFR Part 141] MCLs, are protective of human health
for individual chemicals and are developed using MCLGs, available treatment
technolo- gies, and cost data. Requirements for Secondary Maximum Contaminant
Levels are located at 40 CFR Part 143.

Chapter 62-550, FAC, Florida Drink- Established to implement the Federa
adopting the Florida MCLs were considered when identifying action a
ing Water Standards - September national primary and secondary drinking
and ment levels.
1994 by creating additional rules to fulfill State
require-
ments for community water distribution systems.

Notes: ARARs = applicable or relevant and appropriate requirements.
NAS = Naval Air Station.
CFR = Code of Federal Regulations.
OU = Operable Unit.

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Consideration in the Remedial
Standards and Requirements Synopsis

Federal

Clean Air (CAA) Regulations, This rule provides emissions standa
are promul- The appropriate requirements of these regulations will be achie
Emissions Standards [40 CFR Part gated to attain the National Ambien
Standards during air stripping of extraction groundwater and treatment of
50] (NAAQSs) for hazardous air pollutan
extracted air during in situ bio.
increase in mortality or a serious

CWA Regulations, National Pre- Set pretreatment standards through
Categori- Treated groundwater must meet local limits imposed by FOTW.
treatment Standards [40 CFR Part cal Standards or the General Pretre
for
403] the introduction of pollutants from
into Publicly Owned Treatment Works

control pollutants that pass through, cause interf
or
are otherwise incompatible with treatment processe

POTW.

OSHA Regulations, Occupational Establishes permissible exposure li
OSHA regulations for worker health and safety will be achieved
Health and Safety Regulations [29 exposure to a specific listing of c
CFR Part 1910, Subpart Z]

OSHA Regulations, Recordkeeping, Provides recordkeeping and reportin
appli-
Reporting, and Related Regula- cable to remedial activities.
tions [29 CFR Part 1904]

OSHA Regulations, Health and Specifies the type of safety traini
proce-
Safety Standards [29 CFR Part dures to be used during site invest
remediation.
1926]

RCRA Regulations, Contingency Outlines requirements for emergency
The administrative requirements established in this rule will be met
Plan and Emergency Procedures followed in the event of an emergen
explo- for remedial actions involving the management of hazardous
[40 CFR Part 264, Subpart D] sion, fire, or other emergency even
waste. The groundwater at OU 7 is considered a hazardous waste

"contained-in" rule.
See notes at end of table.

Table 2-
Synopsis of Potential Federa

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Consideration in the Remedial
Standards and Requirements Synopsis

State

Chapter 62-2, FAC, Florida Air Pol- Establishes permitting requirements
or operators Although this rule is directly applicable to industrial
lution Rules - October 1992 of any source that emits any air po
these requirements are relevant and appropriate for this remedial action.
establishes ambient air quality sta

PM10, carbon monoxide, lead, and oz

Chapter 62-272, FAC, Ambient Air Establishes ambient air quality sta
These ambient air quality regulations will be achieved.
Quality Standards - December protect human health and public wel
establish-
1994 es maximum allowable increases in a
for subject pollutants to prevent s
air quality in areas where ambient air quality sta
are
being met. Approved air quality monitoring method
are
also specified.

Chapter 62-532, FAC, Establishes the minimum standards f
The substantive requirements of this regulation will be met during
Florida Water Well Permitting and struction, repair, and abandonment
Permit- construction, repair, or abandonment of monitoring, extractio
Construction Requirements - ting requirements and procedures ar
injection wells.
March 1992

Notes: ARARs = Applicable and/or Relevant and Appropriate Requirements.
NAS = Naval Air Station.
CFR = Code of Federal Regulations.
CWA = Clean Water Act.
FOTW = federally owned treatment work.
OSHA = Occupational Safety and Health Administration.
RCRA = Resource Conservation and Recovery Act.
OU = operable unit.
PM10 = Particulate Matter less then 10 micron in size.
FAC = Florida Administrative Code.

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ATTACHMENT A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

OVERVIEW. A public meeting was held at Naval Air Station (NAS) Cecil Field on March 21, 1996, to discuss the results of the remedial investigation and feasibility study, present the proposed plan, and solicit comments and questions from the public. The Base Realignment and Closure (Act) Cleanup Team (BCT) (representatives from the Navy, U.S. Environmental Protection Agency, and Florid Department of Environmental Protection), NAS Cecil Field Personnel, Public representatives, and the Navy's contractor were present at the public meeting. All of the questions and comments were received during the public meeting's comment period.

BACKGROUND ON COMMUNITY INVOLVEMENT. An active community relations program, providing information and soliciting input has been documented for Operable Unit (OU) 7 and NAS Cecil Field. Informational project updates and technical information have been provided to the Restoration Advisory Board on a monthly basis. Outreach activities have been conducted at local high schools to inform and educate students about remedial actions of NAS Cecil Field. Fact sheets have also been prepared to present the status of remedial activities and are made available at the Environmental Information Repository, located at the Charles D. Wesconnett Branch of the Jacksonville Library in Jacksonville, Florida.

SUMMARY OF PUBLIC COMMENT AND AGENCY RESPONSE. Comments and questions raised during the public meeting are summarized below.

1. Audience Question: Why was Alternative MM-2 selected over Alternative MM-4 if MM-4 was cheaper?

BCT Response: Alternative MM-2 would be easier to install and maintain than Alternative MM-4. Also, OU 7 is located in the industrial area of Cecil Field near the flightline, and Alternative MM-4 would disrupt the flight operations much more than Alternative MM-2.

2. Audience Question: Will nutrients and "bugs" (microorganisms) or just nutrients be added to groundwater in alternative MM-2?

BCT Response: Only nutrients will be added to groundwater in Alternative MM-2. Existing bacteria in the aquifer will be used to degrade the contamination.

3. Audience Question: Will the aircraft hangars located above the groundwater plume be reusable for civilian use?

BCT Response: The aircraft hangars will be reusable for civilian use if the access to contaminated groundwater as a potable source is restricted.

4. Audience Question: Will the contaminated groundwater, which is seeping into the storm-sewer system, be cleaned up?

BCT Response: Yes. The preferred remedial alternative will be remediating the entire groundwater plume. Currently, the concentrations of chlorinated solvents in the storm-sewer system are not posing a risk to human health or the environment at the discharge point approximately 2,700 feet east of OU 7.

5. Audience Question: If results expected are not seen over the first 5 years of operation, is there a mechanism to make an adjustment.

BCT Response: Yes. Each of the remedial alternatives has a 5-year review, at which time the site conditions are reviewed and it is determined if continued implementation of the alternative is appropriate.