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NAS PENSACOLA
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EXPLANATION OF SIGNIFICANT DIFFERENCES OPERABLE UNIT 1 SITE 1 SANITARY LANDFILL NAS PENSACOLA FL

7/1/2011

NAVFAC SOUTHERN

United States Navy July 2011

Explanation of Significant Differences

Operable Unit 1, Site 1- Sanitary Landfill

Naval Air Station Pensacola, Florida

Introduction and Statement of Purpose

An Explanation of Significant Differences (ESD) is required for Operable Unit (OU) 1, also known as Site 1 – Sanitary Landfill, at Naval Air Station (NAS) Pensacola, Florida, to document the rationale for discontinuing active operation of the groundwater interceptor trench and associated groundwater and surface water performance monitoring based on information collected and evaluations conducted since the signing of the OU1 Record of Decision (ROD). The modifications are significant because they involve elimination of a now unnecessary component of the remedy and the associated Remedial Action Objective (RAO), but they do not fundamentally alter the overall cleanup approach documented in the OU1 ROD signed on 19 August 1998.

The Navy is the lead agency, with oversight from United States Environmental Protection Agency (U.S. EPA) and Florida Department of Environmental Protection (FDEP), for cleanup of sites at NAS Pensacola in the Installation Restoration (IR) Program under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as modified by the Superfund Amendments and Reauthorization Act (SARA). The Navy is issuing this ESD for OU1 at NAS Pensacola as part of the public participation requirements under Section 117(c) of CERCLA, Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Navy IR Program. In accordance with Section 300.825(a) (2) of the NCP, this ESD will become part of the Administrative Record file for the facility. The Administrative Record also contains background information that was used in determining the original remedy, as documented in the ROD, in determining the previous remedy modification as documented in the 1999 ESD, and in preparing this ESD. The Administrative Record for NAS Pensacola is included as part of the Information Repository, which is available for review at the following location:

John C. Pace Library
University of West Florida
11000 University Parkway
Pensacola, Florida 32514
850-474-2462

Hours of Availability:
Monday - Thursday • 8:00 am – 9:00 pm
Friday • 8: 00 am – 5:00 pm
Saturday • Closed
Sunday • 1:00 pm – 9:00 pm

Site History, Contamination, and Selected Remedy

NAS Pensacola is located in the northwest portion of the Florida Panhandle and is bordered by Perdido Bay to the north and west, Big Lagoon to the southwest, and Pensacola Bay to the south and east. Various housing, training, and support facilities are located on the base. Most industrial operations were conducted in the older portion of the base, on the eastern end of the peninsula. The western end of the facility includes the main airfield (Forrest Sherman Field) and undeveloped forest land. Currently the primary mission of NAS Pensacola is the training of student aviators, as well as to "fully support the operational and training missions of tenants assigned; enhancing the readiness of the U.S. Navy, its sister armed services, and other customers."

OU1 encompasses approximately 80 acres and includes the former sanitary landfill and surrounding area (see Figure 1). The landfill ranges in elevation from 8 to 20 feet above mean sea level and is heavily wooded with trees and natural shrub vegetation.

The site is bordered to the north by an estuary of Pensacola Bay named the Bayou Grande, to the east by the Navy's A. C. Reed Golf Course, to the west by Navy property covered with vegetation, and to the south by the Barrancas Cemetery.

Bayou Grande is classified by the FDEP as a Class III Water body, indicating its use for recreation and maintaining a well-balanced fish and wildlife population. Surface water from OU 1 drains to the Bayou Grande through two wetlands; one located on the northeast side of the site, Wetland 3 and the other, Wetland 4D, located east from Wetland 3 across John Tower Road and the Navy's A.C. Reed Golf Course.

Wetland 3 is a freshwater wetland that receives shallow groundwater and surface water runoff from OU 1 and appears to be primarily fed by a visible seep at the north end of the wetland. Wetland 3 is bordered by OU1 to the north, south, and west, and by John Tower Road and the golf course to the east. As reported in the Site 41 Remedial Investigation (RI), a narrow surface water channel in this wetland is approximately 4 inches deep, and 1 to 2 feet wide. The remaining Wetland 3 area is from 3 to 500 feet wide, is relatively flat topographically, and consists of saturated sediment drained by a narrow and shallow stream.

The area surrounding the wetland consists of pine trees, and some oaks and other species. The lower section of

Wetland 3 flows into a drainage culvert that discharges into Wetland 4D. This culvert runs east under John Tower Road and a golf course fairway prior to discharging into Wetland 4D.

Wetland 4D is an estuarine open water body fed by Wetland 3 from the west and by Wetland 4C from the south. Wetland 4D discharges north into Bayou Grande through a culvert beneath an unnamed dirt road. Wetland 4D is surrounded by the golf course. The open water portion of Wetland 4D ranges from 1 foot to approximately 8 feet deep and has a maximum width of approximately 700 feet.

A small area of spartina in located within the northwestern corner of Westland 4D. The steep topographic gradient surrounding the wetland makes the transition from upland to open water obvious. The vegetation surrounding Wetland 4D is both mowed grass and tall grasses, with a small stand of pine trees. The presence of mowed grass around a portion of this wetland limits its potential to provide habitat for most species.

Developed areas immediately north of the landfill include a Boy Scout camp, nature trail, NAS Pensacola picnic area, and recreational Buildings 3553 and 3487. Also in this generally developed area are two tidal-inlet ponds with associated wetlands. Other wetland areas are west and east of the landfill; most are associated with marshy intermittent creeks. The nearest residential area (base housing) is approximately 1,000 feet south of Site 1. Potable water for this residential area and all of NAS Pensacola is supplied from Corry Station, approximately 3 miles north of NAS Pensacola.

From the early 1950s until 1976, domestic and industrial wastes from NAS Pensacola and other outlying Navy facilities were disposed of at Site 1. Materials disposed of included, rags soaked with ketones, polychlorinated biphenyls (PCBs), and transformer oil, paint chips and paint sludge, dry air-filter pads from paint booths, compressed air cylinders, asbestos from building demolition, wood soaked with plating solutions, pesticide rinsate, containers of paints, pesticides, oils, strippers, plating chemicals, solvents, thinners, and mercury.

The southernmost portion of the site, used during the 1950s, is the landfill's oldest-known section. In the early 1960s, waste disposal was moved approximately 3,000 feet north to the northernmost portion. Additionally, an area along the site's northwestern border is reported to have been filled with construction rubble during the 1950s and 1960s. From the late 1960s until the closure of the landfill, waste was disposed of in its central portion.

During the earlier years of disposal, wastes were commonly burned before burial; however, this practice ended in the late 1960s. The landfill officially closed on October 1, 1976.

The Navy and U.S. EPA, with the concurrence of the FDEP, selected the cleanup remedy for OU1 in the 1998 ROD, which included the following RAOs:

- Protection of groundwater from leachable compounds from the entire landfill.
- Restoration of site groundwater to state and federal Maximum Contaminant Levels (MCLs) and prevention of further contamination of shallow/intermediate groundwater.
- Prevention of further contamination of surface water in Wetland 3.

The remedy selected and implemented to achieve these objectives included the following main components:

- Institutional controls that are administratively imposed in accordance with the Land Use Control (LUC) Assurance Plan (LUCAP) have been implemented and are maintained by the NAS Pensacola Environmental Office to restrict groundwater use of the surficial zone of the Sand-and-Gravel Aquifer within 300 feet of the site and restrict intrusive activities within the landfill boundary.
- A long-term monitoring (LTM) program (LTMP) has been implemented to ensure that natural attenuation processes are effectively reducing the concentrations of organic compounds to attain performance standards.
- A groundwater Interceptor Trench System (ITS) was implemented to capture and treat iron-contaminated groundwater migrating from the landfill and discharging into Wetland 3, and
- A surface water monitoring program was implemented to evaluate the effectiveness of the ITS.

The remedy as described in the ROD included discharge of treated groundwater from the interception system to Wetland 3; however, a modification to the selected remedy was presented in the ROD and was incorporated during the installation of the ITS.

The modification changed the discharge location from Wetland 3 to the Navy's wastewater treatment system. This modification consisted of redirecting treated effluent into the Navy's wastewater system, in lieu of discharging into the adjacent wetland.

The U.S. EPA and FDEP concurred with the modification to the remedy for OU1 since it did not affect the protectiveness of human health and the environment, it was cost effective and it complied with all the Applicable Appropriate and Relevant Requirements identified in the ROD.

The ITS, which operated from 1999 to May 2010, is approximately 670 feet long, 16 inches wide, and 18 feet deep and filled with limestone. Operation of the ITS included pumping of shallow groundwater from a slotted collection pipe at the bottom of the trench to a pump station for transfer to the Navy's wastewater treatment plant.

Groundwater undergoes passive treatment while passing through the trench as the alkaline limestone material reacts with the dissolved ferrous iron in groundwater to form insoluble ferric iron, which settles out of (precipitates from) the groundwater. When the ITS was in operation, the groundwater was then pumped out of the trench and sent to the Navy's wastewater treatment plant. This passive treatment process is expected to continue within the trench although active pumping of groundwater has been discontinued.

Basis for the Document

After the ROD (Ensafe, 1998) was finalized, LTM was initiated in 2000. Based on data collected through 2002, in the third Annual Groundwater Monitoring Report for OU 1 it was recommended that monitoring only be continued for benzene, xylenes, vinyl chloride, aluminum, cadmium, iron and manganese. Other contaminants (nickel, chlorobenzene, 1,1,2,2-tetrachloroethane, and chromium) were determined to no longer exceed their applicable standards and were dropped from LTM.

After the Fifth Annual LTM Report, an Optimization Study (Tetra Tech, 2006) was conducted to evaluate efficiency and cost-effectiveness of the ITS. In the Optimization Study report it was stated that based on the human and ecological risk assessments conducted during the RI, the ITS is not required to protect human health and the environment based on toxicity studies and risk assessments that showed iron concentrations in Wetland 3 surface water do not pose a threat to human health and the environment.

The Optimization Study also found that although the ITS may contribute to reducing the iron concentrations within shallow groundwater, surface water data indicate that the ITS is not having an appreciable effect on the iron concentrations within Wetland 3. This finding is supported by data collected during 2004 to 2005 due to hurricane damage (pump failure) where the comparative analysis of data collected during "functional" and "non-functional" sampling events presents evidence that the treatment system effectively removes iron from shallow groundwater in some parts of the study area. The Optimization Study also stated that even if the ITS was effectively capturing and treating the local groundwater, the prevalence of iron within the shallow groundwater upgradient, side-gradient, and downgradient to the ITS would make achievement of the RAOs for surface water in Wetland 3 unattainable.

Furthermore, the Optimization Study found that Wetland 3 is naturally treating the effluent iron concentrations. The mechanisms by which this is occurring are believed to be physical, chemical, and biological. Based upon field observations, physical processes including natural sedimentation appear to be occurring where the iron flocculent is dropping out of suspension.

The field observations also indicate that the vegetation in Wetland 3 appears to be growing with little to no stress. This is a good indication that, as identified in the ROD and documented by ITRC (2003), the native vegetation is likely contributing to the reduction of the iron via several mechanisms including sedimentation, adsorption, oxidation, biological, and phytodegradation of the iron. The vegetation also provides an unspecified amount of evapotranspiration in the wetland which aids in treatment.

For groundwater, the Optimization Study determined that the intermediate aquifer zone is mildly or moderately reducing, whereas the geochemistry is generally oxidizing in shallow wells at the same cluster. Oxidizing conditions in the shallow aquifer zone likely persist due to direct recharge of oxygenated water via precipitation infiltration. The persistence of these organic contaminants in the intermediate aquifer zone is likely due to the slow degradation rates of benzene, xylenes, and vinyl chloride under reducing conditions. The natural attenuation evaluation suggested that there is not sufficient evidence for widespread occurrence of reductive dechlorination (TtNUS, 2003b) at the site.

Current site conditions suggest, however, that reductive dechlorination of source materials (i.e., chlorinated ethanes and ethenes) from the landfill has occurred, as evidenced by the lack of detectable parent compounds (e.g., 1,1,2,2-tetrachloroethane, tetrachloroethene, trichloroethene, etc.), the presence of daughter or breakdown products the Optimization Study concluded for groundwater that based upon the historical analytical and geochemistry data there is little evidence that reductive dechlorination is effectively reducing the organic contaminants (e.g., vinyl chloride) in groundwater. Other U.S. EPA accepted natural attenuation mechanisms including aerobic oxidation, anaerobic oxidation, volatilization, dilution, advection, and others may be effective in reducing the concentrations of these contaminants.

The Optimization Study recommended discontinuing the pumping operation of the ITS and to modify the monitoring program related to the ITS and Wetland 3 area because iron concentrations were below human health and ecological risk-based levels.

The Optimization Study also recommended natural attenuation of organic constituents in groundwater and to continue to perform LTM of OU1 groundwater on a site-wide basis. To demonstrate that natural aerobic oxidation is effectively reducing the organic contaminants, additional data will need to be collected. These additional data will be provided through the installation of additional wells along the groundwater flow path and a staff gauge in the Bayou Grande.

In 2008, Tetra Tech completed a Five-year Review for NAS Pensacola to determine if the selected remedy at the OU's is protective of human health and the environment. The Five-year Review found that the detected concentrations of iron in groundwater samples collected from monitoring wells located downgradient from the ITS continue to exceed both the Florida Class III surface water quality criteria of 1,000 micrograms per

liter (µg/L) and the MCL for iron of 300 µg/L as specified in Chapter 62-550, Florida Administrative Code (F.A.C.), as well as the site-specific background concentration for freshwater wetlands of 2,360 µg/L.

The Five-year Review concurred with Optimization Study and stated that: "The design and subsequent performance of the trench does not appear to be sufficient to capture and extract the iron contamination migrating to the wetland. Furthermore, even if the ITS was effectively capturing and treating the local groundwater (which it does not appear to do based upon the elevated iron concentrations in groundwater immediately downgradient of the ITS) the prevalence of iron within the shallow groundwater upgradient, side-gradient, and downgradient to the ITS would make achievement of the RAOs for surface water in Wetland 3 impractical with the existing system. In summary, the system is not currently meeting, or expected to meet, the reductions necessary for cleanup." The Five-year Review determined that because the ITS is not meeting the RAOs, modification of the existing remedy is necessary.

Two alternative modifications were developed: 1) increase the influence and capacity of the capture and treatment system to address the magnitude of the iron contamination discharging into Wetland 3; or 2) discontinue active pumping in the ITS coupled with monitoring and the modification of the remedial goals for the existing remedy.

The Five-year Review also indicated that monitoring for iron should continue considering that Wetland 3 is already an integral part of the treatment process for iron, it is expected that iron concentrations in Wetland 3 will remain stable and may decrease over time.

A Reconnaissance Phase Flow Control Pilot Study, Operable Unit 1 (Tetra Tech, 2009) was conducted to evaluate the effectiveness and impacts of blocking the culvert that connects Wetland 3 and 4D. The intent of blocking the culvert would be to effectively isolate Wetland 3 from Wetland 4D, thereby protecting Wetland 4D by creating an infiltration area within Wetland 3 for groundwater and surface water previously discharging to Wetland 4D through the culvert. The primary purpose of the Pilot Study was to determine if blockage of the culvert would be effective in creating this infiltration gallery in Wetland 3. In addition, the Pilot Study also evaluated whether blocking the culvert would cause detrimental effects such as localized flooding in Wetland 3 or the surrounding area.

The Reconnaissance Phase Flow Control Pilot Study concluded that: groundwater currently discharges to surface water in Wetland 3 and that the groundwater-surface water interaction pattern cannot be changed unless the water level is increased to 7.07 feet at the inlet of the culvert. Water levels required for the upstream area would be even higher. Even if the water level can be sufficiently increased to change the current gaining situation, it is not clear whether a losing situation can be created in the area because of the high groundwater elevations southeast of the culvert. The high groundwater elevations will keep groundwater discharging to the surface water from the southeastern side. Considering the relatively low elevation of John Tower Road near the culvert, blocking the culvert would result in flooding over the road and golf course. Based on these conclusions, it is recommended that no further flow control evaluation be conducted.

Additionally, iron background concentrations were updated as part of the Reconnaissance Phase Flow Control Pilot Study because "pristine" wetlands (Wetlands 27 and 33) were originally used to established background values for all wetlands at NAS Pensacola as part of the Site 41 RI. The background iron concentration for fresh water wetlands at NAS Pensacola was established as 2,360 µg/L and 1,352 µg/L was established for estuarine wetlands.

The background iron concentration for freshwater and estuarine wetlands were reevaluated because the original data set was small and potentially non-representative; the highly variable iron concentrations that have been detected in the over 80 freshwater and estuarine wetlands at NAS Pensacola; and that it was determined that many of the wetlands contained iron at naturally occurring concentrations that exceeded the original background value.

The background analysis was conducted using the Navy's guidance document Procedural Guidance for Statistically Analyzing Environmental Background Data (NAVFAC, 1998). The background values were set at two times the average concentrations of a four-sample data set. The freshwater wetland background threshold was determined to be 4,720 µg/L and the estuarine wetland background threshold was determined to be 5,862 µg/L.

The Reconnaissance Phase Flow Control Pilot Study indicated that the ITS should be stopped because: the optimization and flow control studies for OU1 (Tetra Tech, 2006 and 2009) have demonstrated that this system is not effectively reducing iron concentrations, Wetland 3 naturally treats iron, and iron concentrations in Wetland 3 do not adversely affect human or ecological receptors.

Therefore, it was recommended that because all surface water iron concentrations in Wetland 4D are less than or nearly equal to the proposed estuarine wetland background threshold (5,862 µg/L), monitoring on an annual basis is recommended at a new Point of Compliance (POC) to be established in Wetland 4D. Wetland 4D receives water from the southwestern side of Wetland 3 and from Wetlands 4A-4B-4C at the southeastern side of Wetland 4D. The POC location was selected to represent surface water quality in Wetland 4D prior to where it drains to Bayou Grande through a culvert near the northern corner of the wetland. The POC location is approximately midway between the mixing

point of the two water sources and the culvert.

Following the recommendations of the various technical documents (Optimization Study, Five-year Review and Reconnaissance Phase Flow Control Pilot Study) the groundwater interception system, was decommissioned in May 2010.

Description of Significant Differences

Based on the lack of unacceptable human health or ecological risk associated with iron concentrations in Wetland 3, the prevalence of background iron concentrations across the facility that exceed Florida Class III fresh and marine surface water quality criteria per Chapter 62-550, F.A.C., and the inability of the ITS to address iron from all sources, the recommendations of the Optimization Study, Five-year Review, and Reconnaissance Phase Flow Control Pilot Study were to discontinue the pumping operation of the ITS and to modify the monitoring program related to the ITS and Wetland 3 area.

Based on these recommendations and on discussions/decisions at NAS Pensacola Partnering Team meetings, the ITS was shut down and was decommissioned in May 2010. Sampling and analysis for total iron of groundwater from six OU1 monitoring wells (01MW01, 01MW02, 01PZ6, 01PZ7, 01PZ8, and 01PZ10) was recommended based on review of existing ITS monitoring data. Monitoring of surface water at Wetland 3 was recommend to continue at locations 01SW01 and 01SW02 after review of recent monitoring data showing that iron concentrations are less than risk-based levels. Additionally, location 01SW01 was moved approximately 250 feet south of the previous location and a new POC, 01SW03, was established in Wetland 4D.

Because prevention of OU1 groundwater discharge to Wetland 3 is not required for protection of human health and the environment, the surface water RAO included in the OU1 ROD and the associated components of the remedy (ITS operation and associated monitoring) are no longer required.

This ESD documents the determination by the Navy, U.S. EPA, and FDEP that modification of the OU1 remedy to eliminate the groundwater interception component of the remedy is appropriate and that ongoing implementation of the remainder of the remedy continues to be protective of human health and the environment.

LUCs continue to prevent potentially unacceptable exposure to contaminated groundwater and landfill materials, and long-term groundwater monitoring continues to verify that natural attenuation processes are decreasing concentrations of organic compounds to attain performance standards. In addition, surface water monitoring in Wetland 4 (into which Wetland 3 discharges) is used to verify that discharges from NAS Pensacola (including OU1) do not cause unacceptable to impacts to Bayou Grande (a state-classified Class III water body).

Changes have not been made to the LUC or natural attenuation monitoring components of the remedy, with the exception of ongoing optimization of the LTMP (based on monitoring results and with the approval of U.S. EPA and FDEP).

As presented in the Optimization Study Report, the total cost savings associated with implementing these recommendations was estimated as $634,984, a 55-percent decrease from the total present-worth cost for continuation of ITS operations.

Support Agency Comments

U.S. EPA and FDEP representatives, as part of the NAS Pensacola Partnering Team, have had ongoing involvement in the decision-making process associated with the change in the OU1 remedy. The Navy has obtained concurrence from the U.S. EPA and FDEP on the modification to the cleanup remedy for OU1.

Statutory Determinations

The proposed change to the selected remedy will continue to satisfy the statutory requirements of CERCLA Section 121, and the modified remedy will remain protective of human health and the environment and will continue to comply with federal and state Applicable or Relevant and Appropriate Requirements and be cost effective.

Public Participation

Public participation requirements as outlined in the NCP, Section 300.435 (c) (2) (i) have been met.

For More Information

If you have questions or would like further information about this ESD for OU1 at NAS Pensacola, please contact:

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DECLARATION

The issuance of this ESD for OU1 at NAS Pensacola is concurred with.

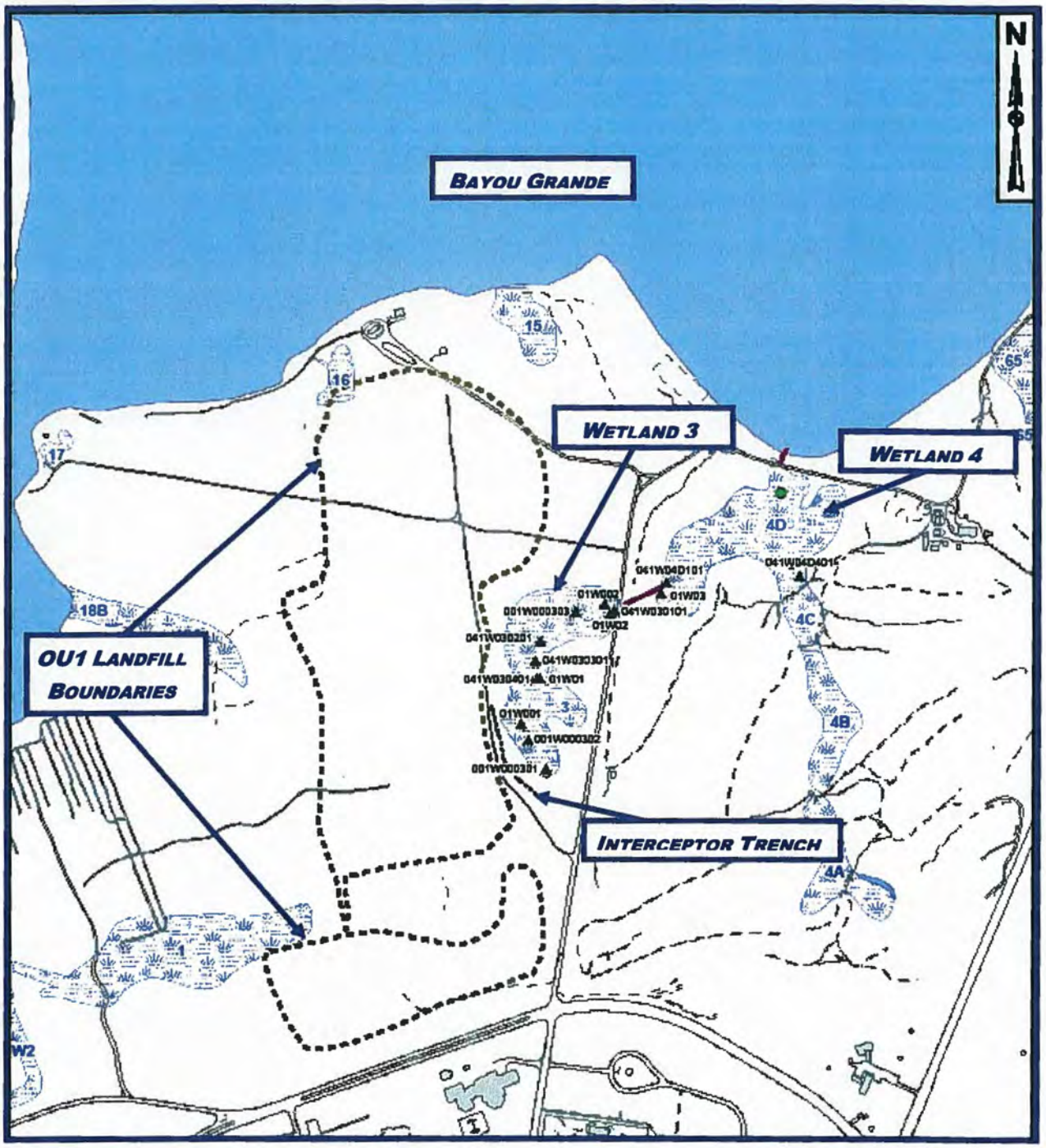
United States Department of the Navy:

Captain Christopher Plummer **Date**
Commanding Officer
NAS Pensacola

United States Environmental Protection Agency:

Franklin E. Hill **Date**
Director
Superfund Division
U.S. EPA Region 4

FIGURE 1 – OU1 SITE LAYOUT



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