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INTERIM CORRECTIVE MEASURES WORKPLAN SITE 8, FORMER HERBICIDE ORANGE STORAGE AREAS NCBC GULFPORT MS
8/1/1996
ABB ENVIRONMENTAL

INTERIM CORRECTIVE MEASURES WORKPLAN SITE 8, FORMER HERBICIDE ORANGE STORAGE AREAS

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

UNIT IDENTIFICATION CODE: N62604
CONTRACT NO. N62467-89-D-0317/096

SEPTEMBER 1996

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

The engineering recommendations and professional opinions rendered in this planning document describe the proposed interim corrective measures for Site 8 and Site 8-related drainage ways, Naval Construction Battalion Center, Gulfport, Mississippi. The engineering recommendations were developed in accordance with commonly accepted procedures consistent with applicable standards of practice. This document is not intended to be used for construction of a selected corrective measure. Any additional information about site conditions should be made available to the undersigned for review, evaluation, and possible modification of the number, type, description, and components of the interim corrective measures that are proposed herein.

Ricky A. Ryan

Mississippi Professional Engineer
Number 12503
Expires December 31, 1996

INTERIM CORRECTIVE MEASURES WORKPLAN
SITE 8, FORMER HERBICIDE ORANGE STORAGE AREAS

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

Unit Identification No. N62604

Contract No. N62467-89-D-0317/096

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August 1996

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FOREWORD

To meet its mission objectives, the U.S. Navy performs a variety of operations, some requiring the use, handling, storage, or disposal of hazardous materials. Through accidental spills and leaks and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at their facilities.

One of these programs is the Installation Restoration program. This program complies with the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act, the Resource Conservation and Recovery Act (RCRA), and the Hazardous and Solid Waste Amendments (HSWA) of 1984. These acts establish the means to assess and clean up hazardous waste sites for both private-sector and Federal facilities.

The program that has been adopted to address present hazardous material management is RCRA and the HSWA (RCRA/HSWA) corrective action program. RCRA ensures that solid and hazardous wastes are managed in an environmentally sound manner. The law applies to facilities generating or handling hazardous waste. The HSWA corrective action program is designed to identify and clean up releases of hazardous substances at RCRA-permitted facilities.

The RCRA/HSWA program is conducted in four stages, as follows:

- RCRA Facility Assessment,
- RCRA Facility Investigation,
- Corrective Measures Study, and
- Corrective Measures Implementation.

The Southern Division, Naval Facilities Engineering Command manages and the U.S. Environmental Protection Agency and the Mississippi State Department of Environmental Quality oversee the Navy environmental program at Naval Construction Battalion Center (NCBC), Gulfport, Mississippi. All aspects of the program are conducted in compliance with State and Federal regulations, as ensured by the participation of these regulatory agencies.

Questions regarding the RCRA program at NCBC Gulfport should be addressed to Mr. Art Conrad, Code 1865, at (803) 820-5520.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
AO	Administrative Order
2,4-D	2,4-dichloro-phenoxyacetic acid
EG&G	EG&G Idaho, Inc.
HAZWRAP	Hazardous Waste Remedial Actions Program
HDPE	high density polyethylene
HO	herbicide orange
ICM	interim corrective measure
LDPE	low density polyethylene
MSDEQ	Mississippi State Department of Environmental Quality
NCBC	Naval Construction Battalion Center
NCF	Naval Construction Force
ppb	parts per billion
ppq	parts per quadrillion
ppt	parts per trillion
SAP	sampling and analysis plan
SOUTHNAV-FACENGCOM	Southern Division, Naval Facilities Engineering Command
SRTs	sediment recovery traps
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
TCDD	tetrachloro-dibenzo-p-dioxin
TEQ	toxicity equivalency quotient
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

Under contract to the U.S. Department of the Navy, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), this Interim Corrective Measure (ICM) workplan was prepared for Site 8 located on the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. This workplan was prepared under the Comprehensive Long-term Environmental Action, Navy, Contract No. N62467-89-D-0317, Contract Task Order No. 096.

On February 14, 1996, Administrative Orders (AOs) No. 3193-96 and No. 3194-96 were issued to the U.S. Navy and U.S. Air Force (USAF), respectively, by the Mississippi State Department of Environmental Quality (MSDEQ) as a result of environmental issues regarding the NCBC. These orders contained identical requirements of the Navy and USAF. These orders require an ICM workplan to be submitted to MSDEQ by May 1, 1996. The workplan will describe ICMs to be taken onsite to reduce contaminated sediment transport offsite.

The following sections provide the purpose and scope of the ICM workplan, the site history, regulatory setting, a summary of previous investigations and ICMs, and an overview of the organization of the ICM workplan.

1.1 PURPOSE AND SCOPE OF THE ICM WORKPLAN. The ICM workplan is one of the primary initial components of the corrective action program for Site 8. The purpose of the ICM workplan is to propose measures to abate threats to human health and the environment. The measures proposed would reduce the further transport of sediment associated with releases of herbicide orange (HO) dioxin from Site 8 while long-term remedies are pursued. The measures proposed are intended to be performed onbase and in coordination with delineation activities proposed in the *Onsite Delineation Workplan, Site 8, Herbicide Orange Storage Areas, Naval Construction Battalion Center, Gulfport, Mississippi* (ABB Environmental Services, Inc. [ABB-ES], 1996a). The other main components of the corrective action program for Site 8 and their objectives as described in the AO are listed below.

- Onsite Delineation – to delineate the vertical and horizontal extent of the dioxin and other dioxin-related contaminants in soil, sediment, groundwater, and surface water at Site 8 and its related drainage ways.
- Offsite Delineation – to delineate the vertical and horizontal extent of dioxin and other dioxin-related contaminants offbase (areas including Canal No. 1, Turkey Creek, Bernard Bayou, and off-base ditches and drainage ways) in sediment, soil, surface water, and groundwater.
- Onsite Remediation – to develop, evaluate, design, construct, operate, maintain, and monitor the performance of a remedial alternative for the onsite contaminated media identified in the onsite delineation.
- Offsite Remediation – to develop, evaluate, design, construct, operate, maintain, and monitor the performance of a remedial

alternative for the offsite contaminated media identified in the offsite delineation.

- Biological Monitoring – to conduct long-term biological monitoring in all surface aquatic environments (areas including Canal No. 1, Turkey Creek, Bernard Bayou, and onbase and offbase ditches and drainage ways) potentially affected by dioxin and other dioxin-related contaminants in soil, sediment, surface water, and groundwater discharged from the base.

- Groundwater Monitoring – to investigate and delineate the extent of contamination in the groundwater from dioxin and other contaminants at NCBC.

The scope of this ICM workplan has been defined based on: (1) the AO; (2) a meeting to clarify the AO requirements held with MSDEQ on March 21, 1996; and (3) the contaminants and release mechanisms identified in the current Site 8 conceptual model. The implementation of this ICM workplan will include the following tasks:

- predesign activities;

  – performance sampling of the existing sediment recovery traps (SRTs)
  – a site survey and inspection

- design activities;

  – an engineering evaluation for future SRT locations
  – design of future SRTs
  – design of a temporary cover for Site 8 (if required)

- procurement and installation activities; and

- performance evaluations of existing and newly installed SRTs.

The purpose of this ICM workplan is to identify the ICMs to be taken for Site 8 and the related drainage ways to reduce offsite transport of contaminated sediment. The ICM workplan will outline the objectives of the ICM activities and describe the approach that will be used to meet those objectives.

1.2 SITE HISTORY. NCBC Gulfport is located in the western part of Gulfport, Mississippi, in Harrison County, in the southeastern corner of the state, approximately 2 miles north of the Gulf of Mexico (Figure 1-1). The base is located on the north side of Gulfport (Figure 1-2) approximately 1 mile from Highway 49.

The primary mission of NCBC Gulfport is the support of four battalions of the Naval Construction Force (NCF) and the storage and maintenance of prepositioned War Reserve Material Stock. The NCF support consists of both homeport services and deployed support. Approximately 4,000 military and 1,600 civilian personnel are assigned to or employed by the base. The base occupies 1,100 acres and has an elevation averaging 30 feet above sea level (Figure 1-3), with the only significant exception being the linear piles of bauxite stored on the surface. These

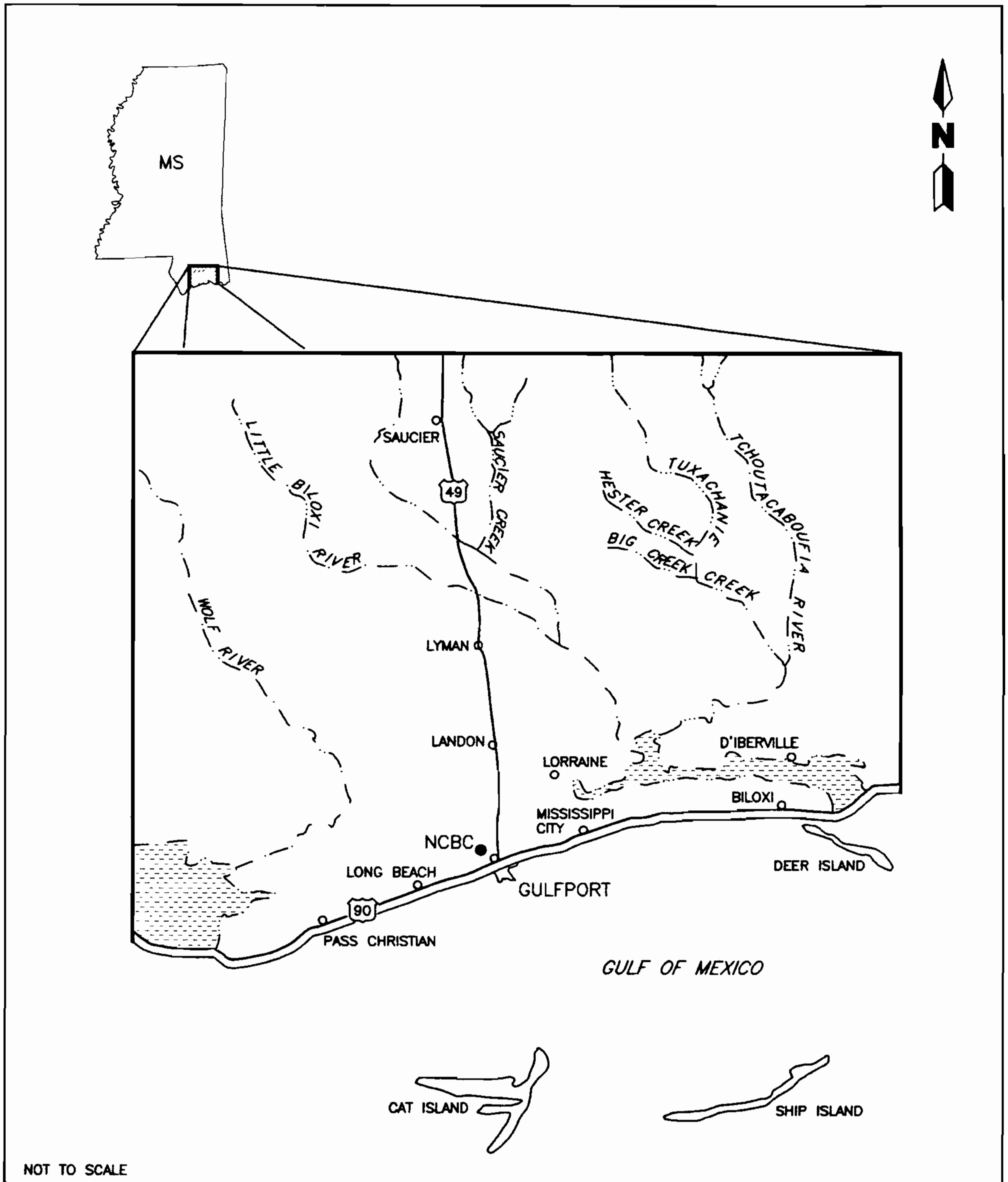

FIGURE 1-1

NCBC LOCATION MAP

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

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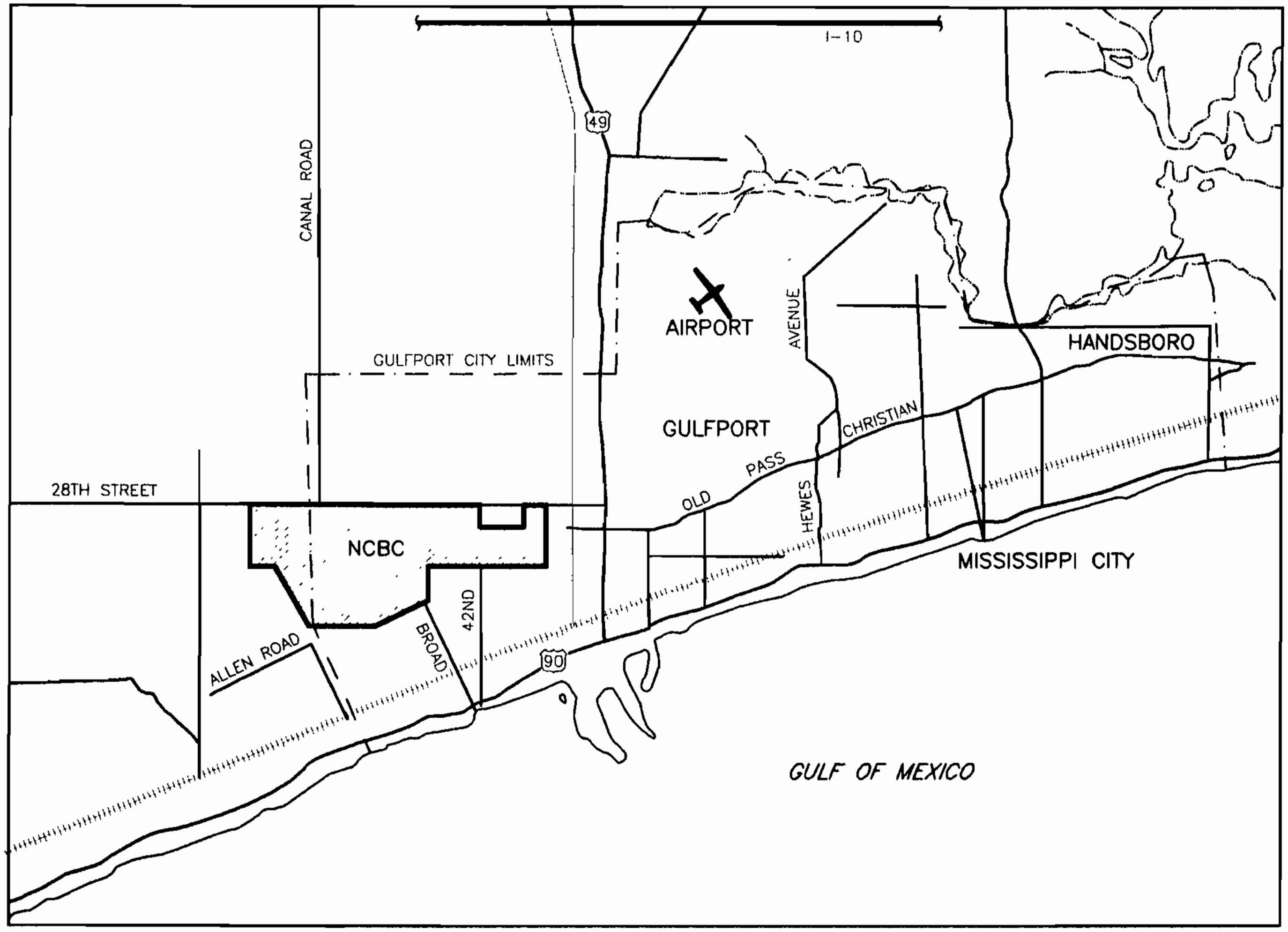

FIGURE 1-2

VICINITY MAP

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

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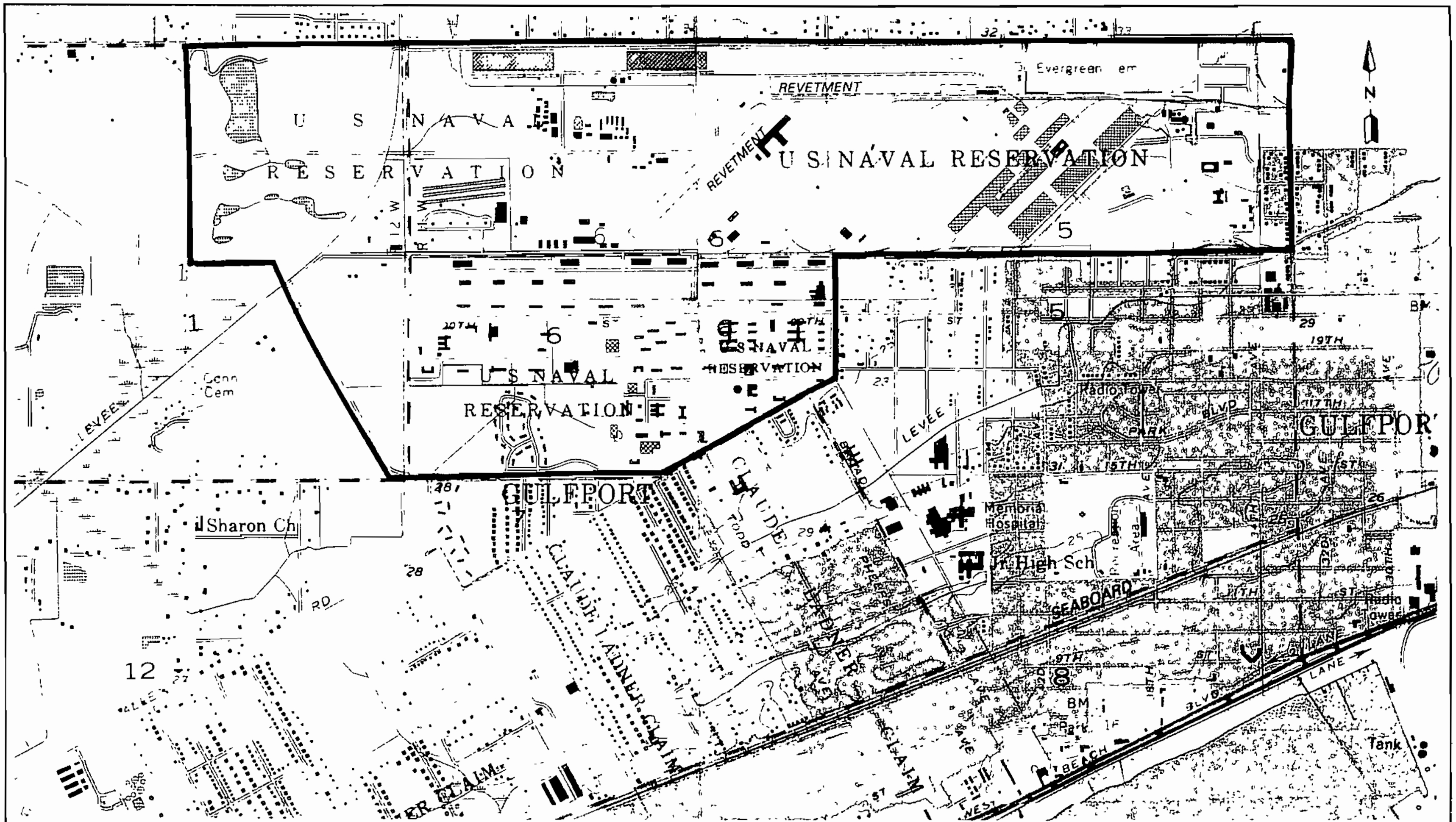

SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES GULFPORT NW, GULFPORT NORTH, PASS CHRISTIAN AND GULFPORT SOUTH MISSISSIPPI QUADS.

FIGURE 1-3

TOPOGRAPHIC MAP OF SITE VICINITY

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_1-3\DMF\960424

bauxite piles range from 30 to 40 feet above the grade of the base. Surface soils are primarily sand to sandy loam with minor clays (Hazardous Waste Remedial Action Program [HAZWRAP], 1991).

From 1968 through 1977, about 12 acres of the base (Site 8) were used for storage and handling of approximately 850,000 gallons of HO in 55-gallon drums (Figure 1-4). Spills and leaks of HO occurred during that period in the area later known as Site 8. The magnitude of the release of HO and dioxin was investigated in 1977 and was known as the Initial HO Monitoring Program (Occupational and Environmental Health Laboratory, 1979). Followup investigations in 1986 and 1987 delineated the horizontal and vertical extent of dioxin in soil to 1 part per billion (ppb). The delineation work was followed by full-scale incineration of the soil at Site 8 that was contaminated above 1 ppb. The incineration was completed in 1988, and the resulting ash was stored in piles on Area A of Site 8 (HAZWRAP, 1991).

1.3 REGULATORY SETTING. This workplan was initiated following the issuance of the AO by MSDEQ on February 14, 1996. The direction of the AO was clarified by MSDEQ in a meeting on March 21, 1996. In that meeting the following items were determined.

- The AO would address dioxin and the constituents of HO.
- Onsite was defined as onbase and offsite was defined as offbase.
- The ash at Site 8 would be handled under the Resource Conservation and Recovery Act, and the remaining impacted media would be handled under the Comprehensive Environmental Response, Compensation, and Liability Act.
- The method for removing and placing dioxin-impacted sediment and soil at Site 8, employed during the 28th Street Emergency Action, would be used for remediating dioxin-impacted sediments and soils encountered during onbase and offbase delineation activities.

1.4 PREVIOUS INVESTIGATIONS. In 1984, the results of the initial assessment were reported on Site 8A. This study provided the initial definition of HO leakage and spillage through limited sampling and analysis programs. The major findings on the Initial Monitoring Program (HAZWRAP, 1991) were:

- soil samples from approximately 2 to 4 acres of the 12-acre former storage area were found to contain HO and associated dioxin;
- tetrachlorodibenzo-p-dioxin (TCDD) was detected in sediment biological specimen samples collected from the drainage system leading away from Site 8; and
- the movement of dioxin from the storage site seemed to occur primarily through soil erosion, caused by water, wind, or human activity.

The results of this investigation promoted the Comprehensive Soil Characterization Study (EG&G Idaho, Inc. [EG&G], 1987 and 1988). The original sampling and

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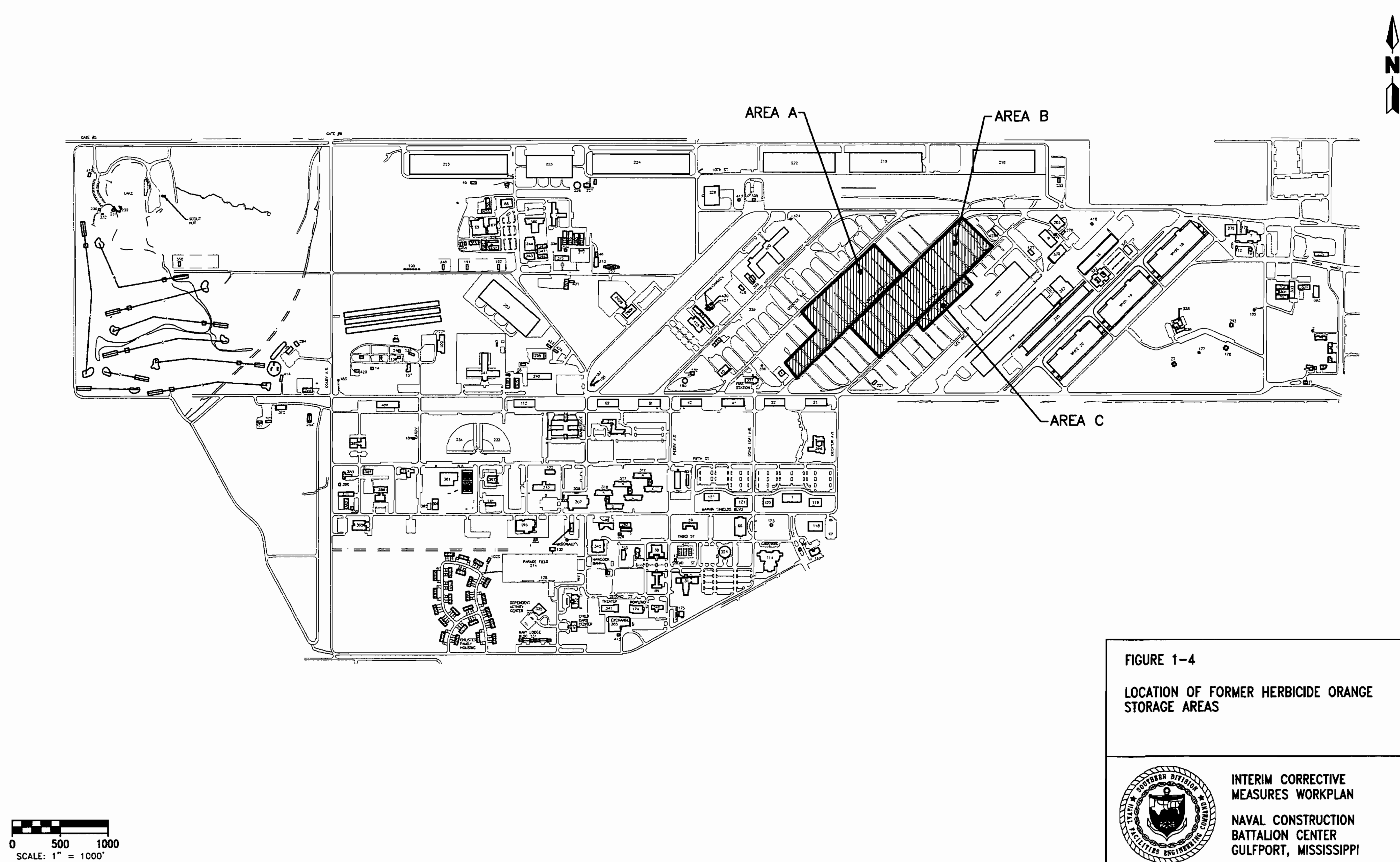

FIGURE 1-4

LOCATION OF FORMER HERBICIDE ORANGE STORAGE AREAS

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

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analysis program focused on a portion of the storage site now designated as Area A. This was believed to be the area where HO drums were stored. However, two additional areas designated as Areas B and C, located outside the original HO storage area, were identified and verified as sites of additional drum storage. This prompted a Comprehensive Characterization of Sites 8A, 8B, and 8C. The comprehensive study was performed to delineate the horizontal and vertical extent of HO (2,4-dichloro-phenoxyacetic acid [2,4-D] and 2,4,5-trichlorophenoxyacetic acid [2,4,5-T]) and dioxin in the soil at the former HO storage area. This study proceeded in two parts: (1) Area A and (2) Areas B and C as add-on studies. The results of this study are listed below.

- Toxicity equivalency quotients (TEQs) for dioxin and furan congeners ranged from nondetect to 1,000 ppb.

- TEQs for dioxin and furan congeners above 1 ppb were limited to 2 feet in depth with a strong trend toward decreasing levels with depth.

- A 95 percent confidence level was estimated for excavating the majority of soil containing TCDD to 1 ppb (26,990 cubic yards) (HAZWRAP, 1991).

Under a U.S. Environmental Protection Agency (USEPA) Research Development and Demonstration permit issued in July 1986 (USEPA, 1986a), remediation of Areas A, B, and C was undertaken, with approximately 30,000 cubic yards of impacted soil excavated from the storage areas and incinerated based upon a cleanup criterion for dioxin of 1 ppb (HAZWRAP, 1991). The resulting ash from the incineration was placed back upon approximately one-third of Area A. At that time, no decision had been reached on the petition to delist the ash, characterized as F028 waste, due to discrepancies in the analytical data submitted with the delisting petition.

In November 1987, USEPA Region IV provided final approval to conduct full-scale treatment of the NCBC Site 8 soils. Incineration of the impacted soil containing dioxin above 1 ppb was completed in 1988.

An offsite dioxin contamination survey was performed during the Comprehensive Soil Study (EG&G, 1988) to evaluate potential health impacts from exposure to sediments containing TCDD and to evaluate potential impacts on people who may consume fish and crayfish caught in the drainage system. That study reached the following conclusions:

- no TCDD was detected in potable water supply wells at NCBC;

- concentrations of TCDD in the sediment (less than 270 parts per trillion [ppt]) and biota samples from the NCBC HO storage site drainage system suggest that offsite migration had occurred; and

- at that time, the concentrations of TCDD were below established health risk levels.

On April 10, 1991, SOUTHNAVFACENGCOM authorized sampling of surface soil, surface water, and sediment near the HO site. A characterization of the surface soil was conducted in the area of a construction site known as the Military Construction project P-745, which lies adjacent to the HO site Area C. Results from these field activities suggest the presence of dioxin at 187 ppt in sediment (ABB-ES, 1993).

A Sampling and Analysis Plan (SAP), in support of the delisting petition, was prepared in November 1990 (Versar, 1990). The SAP proposed collecting and analyzing additional ash samples. An addendum to the SAP was completed, which focused on the field investigation, analytical methods, and quality assurance and quality control procedures.

A hydrogeologic assessment at Site 8 was performed in 1994 and 1995 (ABB-ES, 1994, 1995a, 1995b, 1995c, 1995d, and 1996b) as an addendum to the Versar (1990) SAP to determine the impact of HO storage on groundwater. Quarterly groundwater samples were collected from 4 monitoring wells along with 10 samples of ash. Below are results from these sampling activities.

- Groundwater flow across Site 8 is generally to the west-northwest.
- Ash sample results for TCDD ranged from nondetect to approximately 70 ppt, although toxicity characteristic leaching procedure results on the samples with highest results were less than 3 ppt.
- TCDD was detected in groundwater samples collected from shallow monitoring wells at concentrations up to 60 parts per quadrillion (ppq), which is above the maximum contaminant level of 30 ppq.
- TCDD concentrations fluctuated with groundwater levels. For example, during periods of higher groundwater elevations at monitoring well GPT-A-2, TCDD TEQs were approximately 60 ppq and during periods of lower groundwater elevations, TCDD TEQs were 0.15 ppq.

The results from the addendum will be used in the Delisting Petition Addendum (ABB-ES, 1996c, in progress).

In 1995, NCBC contracted ABB-ES to take five soil samples along a fenceline on the south end of Site 8A to assess whether or not detectable concentrations of dioxin were present in the soil. The sampling activity was conducted because the base proposed moving the fence back approximately 20 feet so that a rail line would be located on the outside of the fence rather than inside the fenced area. There was no dioxin detected in the samples, and the fence was relocated (ABB-ES, 1995e).

Also in 1995, ABB-ES (ABB-ES, 1995f) reported on an investigation of surface water and sediment at major outfalls and onflows around NCBC, and collected groundwater samples from all existing monitoring wells at Installation Restoration sites. The results of this study indicate the following.

- Dioxin was detected in the sediment samples collected along Outfalls 1 (0.2 ppt), 3 (150 ppt), and 4 (0.8 ppt) and Onflow 1 (74 ppt).
- Dioxin was detected in a groundwater sample from one monitoring well at Site 4 (34.1 ppq).

- Dioxin was detected at 1.2 ppq in a surface water sample.
- Sediment containing dioxin is likely migrating offbase through Outfalls 1, 3, and 4.

In mid-1995, a Defense Construction Roadway project along 28th Street coupled with the presence of sediment containing dioxin at the base boundaries prompted additional sediment sampling along the north side of the base. Sediments containing dioxin were found up to 3 feet below grade at Outfalls 1, 3, and 4. This discovery initiated the Interim Removal Action 28th Street (ABB-ES, 1995g). A plan to remove the affected sediments at the identified outfalls and place them on Site 8 was approved by MSDEQ. The excavation was completed in July 1995.

1.5 WORKPLAN ORGANIZATION. This ICM workplan for Site 8 is organized into six chapters which outline the technical approach for the ICM. The contents of each chapter are described below.

Chapter 1.0, Introduction, presents the site history, regulatory setting, previous investigations, and organization of the ICM workplan.

Chapter 2.0, Site 8 Conceptual Model, provides the current understanding, visualization and description of potential sources, target analytes, media of interest, nature of HO and dioxin, and dioxin transport and deposition.

Chapter 3.0, ICMs Already Implemented, provides a brief description of the two ICMs already implemented. This description includes the existing sediment recovery traps and the offsite excavation along 28th Street.

Chapter 4.0, ICMs, discusses the replacement of existing SRTs (as required) and installation of new SRTs. Also included is a temporary cover for Site 8 and site drainage controls that may be performed based on results from onsite delineation activities.

Chapter 5.0, Project Plans, identifies the various plans associated with the ICM such as the Health and Safety Plan, Waste Management Plan, Monitoring Plan, ICM Design Plans and Specifications, the ICM Installation Workplan, the Construction Quality Plan, and the ICM Operations and Maintenance Plan.

Chapter 6.0, Project Sequence, describes the sequence of project activities. A schedule is also presented for the ICM design and implementation activities.

2.0 SITE 8 CONCEPTUAL MODEL

The conceptual model developed in this chapter will be used to guide the investigative and remedial processes in the most efficient manner possible. This conceptual model provides the basis for proposed ICMs and eventually will help in selecting the most effective remedial options. As new data are collected from onsite delineation activities, the conceptual model and ICM strategy will be revised accordingly.

2.1 POTENTIAL SOURCES. Currently, the storage and handling of HO is suspected as the source of the dioxin and related congeners detected in soils, surface water, sediment, and groundwater on and off the base. Dioxin is a by-product of the HO manufacturing process. HO is the suspected source for dioxin because of the unique chemical family members, or congeners, of its constituent dioxins and furans. These congeners, especially TCDD, are generated during the HO manufacturing process and are good indicators of the source of the dioxin. To date, no other manufacturing process in the area has been identified that would produce TCDD.

From 1965 to 1977, nearly 850,000 gallons of HO were stored at Site 8 in 55-gallon drums. No liners, covers, or protective barriers were placed on or around the drums to mitigate potential spills. In 1984, the former storage areas were initially characterized for TCDD. A subsequent investigation in 1986 identified an area of soil at Site 8 (approximately 4 acres) to be impacted with dioxin. Nearly all of the samples collected in that area were above 1 ppb TCDD. This is believed to be the primary source of dioxin in the ditch systems that drain the Site 8 area (Figure 2-1). By 1988, incineration of impacted soils at Site 8 had reduced the levels to approximately 1 ppb or less (HAZWRAP, 1991).

2.2 TARGET ANALYTES. The target analytes for ICM activities, as outlined in the AO, are the dioxin and furan congeners and the constituents that make up HO (2,4-D and 2,4,5-T). The phenoxy-herbicides 2,4-D and 2,4,5-T are known to be in HO, in which the dioxin congeners form as a trace impurity.

2.3 MEDIA OF INTEREST. Dioxin has been detected in four different media: soil, sediment, surface water, and groundwater. Dioxin is hydrophobic in nature. Thus, while dioxin has been detected in groundwater samples at Site 8, groundwater is currently ruled out as a mechanism for dioxin transport or deposition. Considering the affinity of dioxin for soil particles, the primary media of concern are soil and/or sediment. The dioxin is adsorbed to the soil particles and carried by stormwater along drainage pathways and deposited at various locations along the way.

2.4 NATURE OF HO AND DIOXIN. HO, the source of dioxin, was mixed with diesel fuel prior to application as a herbicide and was stored at Site 8 already mixed with diesel fuel. Dioxin is a colorless and odorless solid at room temperature, has a very low aqueous solubility (octanol-water partition coefficient equals 1.93×10^{-5}), and is not likely to be dissolved in water at concentrations above 20 ppt (Arienti and others, 1988). However, dioxin is soluble in oils, fats, and

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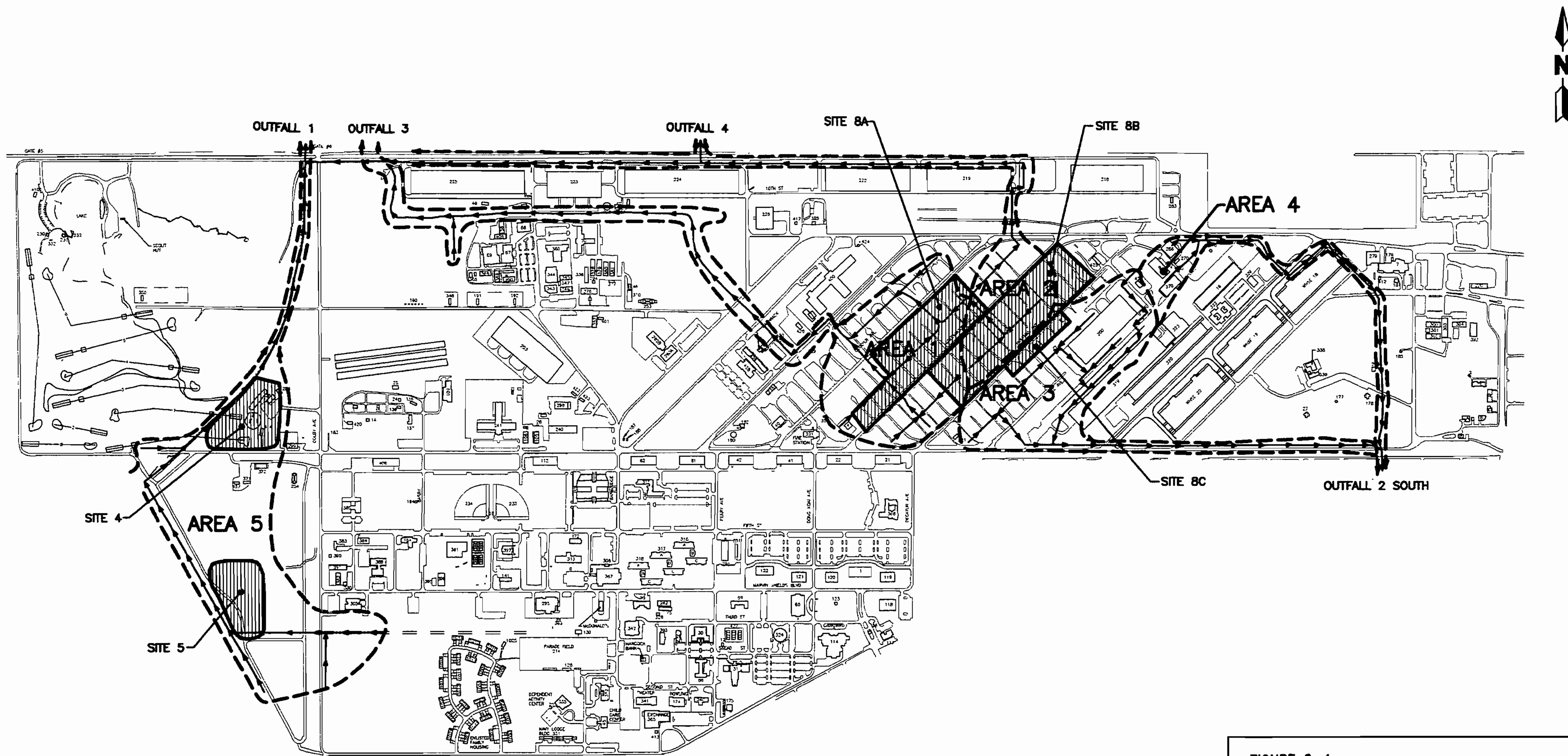

0 500 1000
SCALE: 1" = 1000'

FIGURE 2-1

BASEWIDE DRAINAGE

INTERIM CORRECTIVE MEASURES WORKPLAN

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organic solvents. Dioxin has a specific gravity greater than water and a strong affinity for organic carbon. Dioxin is known to have a long half life in nature before breaking down.

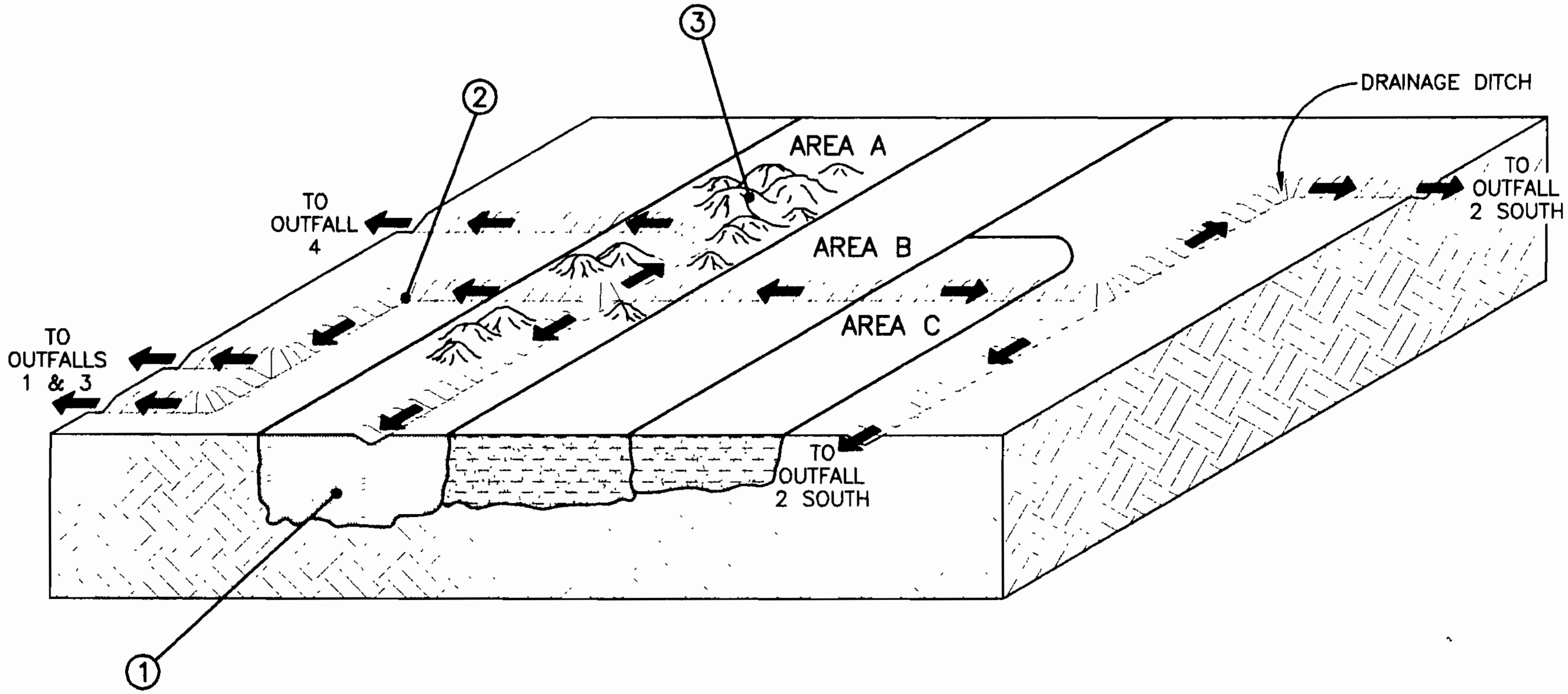
Considering the nature of dioxin, it is likely that dioxin has adhered to soil or organic particles and is mobilized along with the bed load in ditches, or through erosion of surface soil. This has been verified through a comparison of sediment, surface water, and surface soil samples (ABB-ES, 1995f and 1995g).

2.5 TRANSPORTATION AND DEPOSITION OF DIOXIN.

2.5.1 Transportation of Dioxin The main mechanism for dioxin transportation is the erosion and mobilization of soil containing dioxin from Site 8. Figure 2-2 is the conceptual model for Site 8 and associated drainage areas. As shown in Figure 2-1, dioxin-impacted soils at the former storage area could potentially migrate to Outfalls 1 and 3 North through drainage Area 1. Concentrations of dioxins in sediment samples have been obtained in this drainage area. Transport of dioxin to Outfall 4 North could potentially occur through drainage Area 2. Drainage Areas 3 and 4 drain the eastern area of Site 8 and flow through Outfall 2 South.

2.5.2 Deposition of Dioxin Deposition of dioxin occurs through four mechanisms: (1) dioxin-impacted sediment settles out in the bed load in low-velocity environments in the ditches; (2) the dioxin becomes adhered to the organic-rich muck commonly found in the ditches, regardless of stream velocity; (3) sediment is deposited outside the banks of the ditches during high-flow periods; and (4) wind-blown soil from Site 8 is deposited downwind. The first three mechanisms have all been substantiated through sampling, while the wind-blown deposits have been observed but not quantified.

Although dioxin has been detected in groundwater samples at Site 8, groundwater is currently not considered a major mechanism for dioxin transport or deposition. This transport mechanism is excluded based on dioxin's hydrophobic nature and affinity for soil particles.



LEGEND

1. SOIL CONTAMINATION DUE TO HERBICIDE ORANGE STORAGE
2. SEDIMENT RUNOFF
   * SOIL EROSION/RUNOFF
3. ASH EROSION

← FLOW PATH LINES

NOT TO SCALE

FIGURE 2-2

CONCEPTUAL MODEL - SITE 8

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

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3.0 ICMs ALREADY IMPLEMENTED

Surface water and sediments of the NCBC drainage system associated with the former HO storage site were investigated prior to the storage of incinerated ash on Site 8A (see Section 1.4). This investigation determined that contaminated sediments were carried from Site 8 by stormwater flow and deposited in the storm drainage ditches on many areas of the base and eventually in estuaries offbase. In an effort to stop this depositional activity, SRTs were installed at various locations throughout the base. Additionally, contaminated sediment in drainage ditches along 28th Street were found to contain dioxin and related congeners (north of base property), and the contaminated sediment was excavated and brought back onbase and stored at Site 8A.

3.1 SRTs. In 1988, an SRT was constructed to test its ability to trap and deposit contaminated sediment while allowing surface water to pass through. Confirmation samples were taken upstream and downstream of the SRT to verify its ability to reduce contaminated sediment containing dioxins.

In April 1995, ABB-ES installed 12 pilot-scale SRTs (Figure 3-1) in the drainage ditches at various locations onbase to reduce the migration of contaminants offbase by the trapping of suspended sediment and bed load of the ditches. The SRTs were constructed of approximately 15 cubic yards of no. 57 gravel with a porous geotextile fabric inner lining (Figure 3-2). Each SRT blocked the entire width of the ditch and had an elevation of approximately 2 feet above static water level. The SRTs were covered with chicken wire to help stabilize the gravel during peak storm events. During heavy rain events, the ditch flow velocities increased and several of the SRTs were either washed away or damaged. In areas of lower flow conditions, the SRTs remained intact. Some of the SRTs have been blocked by large amounts of sediment that collected in the filter fabric. This has resulted in stormwater flowing over the top of the SRTs and/or around the sides, allowing contaminated sediment to travel downstream. Upgrading of the SRT network is discussed in detail in Section 4.1

3.2 OFFSITE EXCAVATION (28TH STREET). Between July 10 and July 20, 1995, dioxin-contaminated sediment was removed from the drainage ditches along the northern boundary of the base between Outfall 1 and Outfall 4 (Figures 3-3, 3-4, and 3-5). The sediment was removed to ensure that personnel working in these ditches, in advance of road widening and improvements along 28th Street, would not be exposed to dioxin levels above an action level determined by MSDEQ.

The interim removal action consisted of dewatering the ditches prior to excavation, excavating sediment that contained at least a toxicity equivalence dioxin above the action level, excavating and storing sediments at the sediment handling area, and collecting confirmation samples in the areas of excavation to ensure that the action level had been reached.

A sediment-handling area was constructed to store the sediment excavated from Outfalls 1, 3, and 4 located along 28th Street. The sediment handling area is located on the southern boundary of Site 8A, roughly in the middle of the base. The sediment-handling area was constructed by first excavating a V-shaped trench

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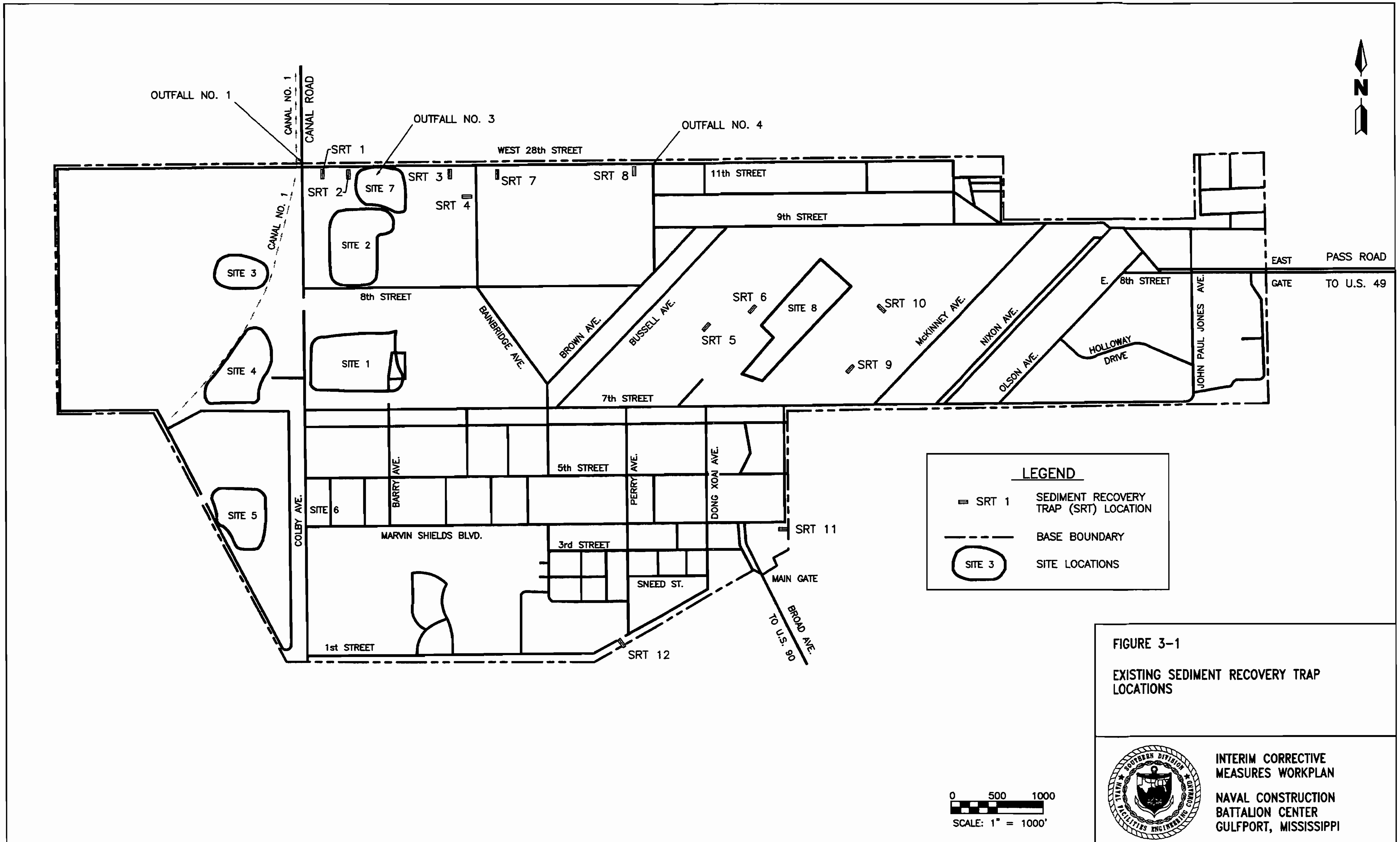


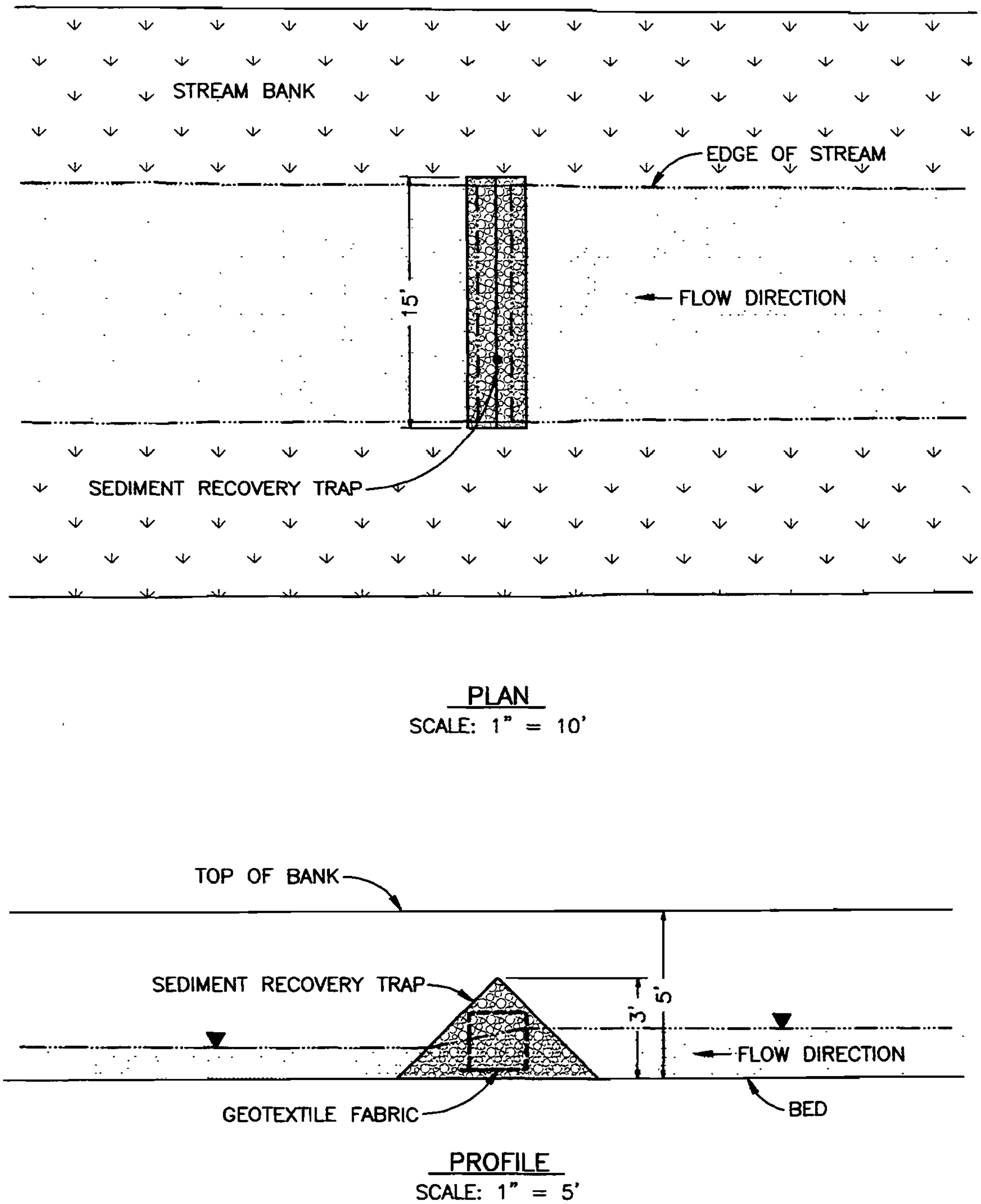
FIGURE 3-1

EXISTING SEDIMENT RECOVERY TRAP LOCATIONS

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_3-1\DMF\960424



SCALE AS NOTED

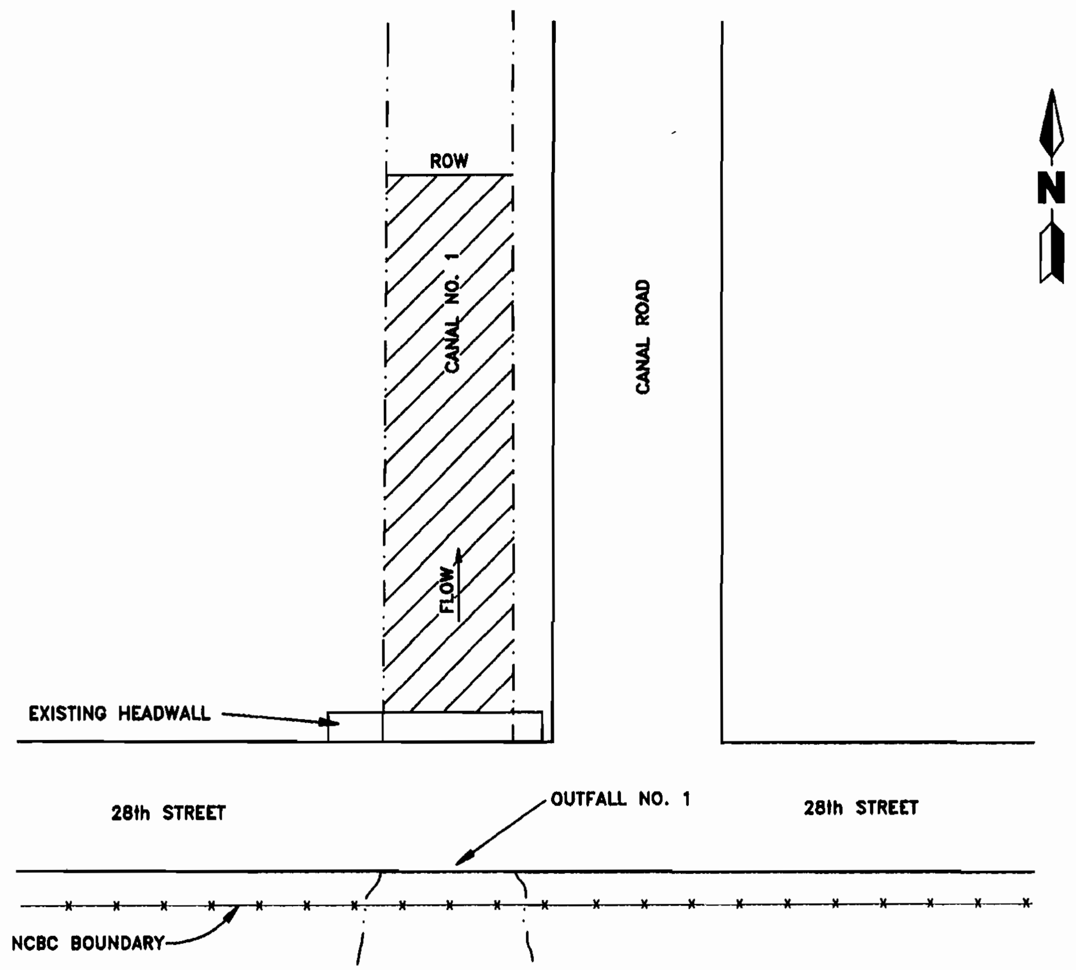
FIGURE 3-2

PLAN AND PROFILE OF EXISTING SEDIMENT RECOVERY TRAPS

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_3-2\DMF\960424



LEGEND

SEDIMENT EXCAVATED TO 4.0' BELOW LAND SURFACE

ROW RIGHT-OF-WAY

NCBC NAVAL CONSTRUCTION BATTALION CENTER

0 15 30

SCALE: 1" = 30'

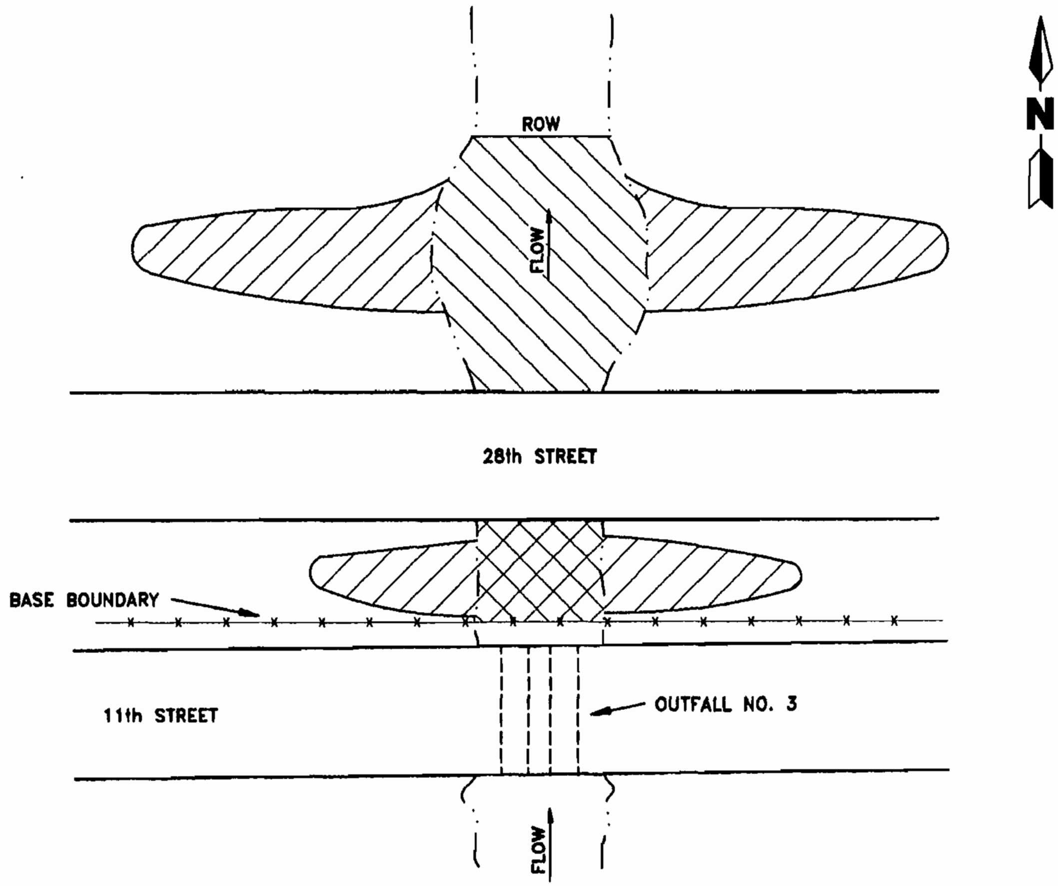
FIGURE 3-3

EXCAVATED AREA AT OUTFALL NO. 1

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_3-3\DMF\960424



LEGEND

- SEDIMENT EXCAVATED TO 3.0' BELOW LAND SURFACE (BLS)
- SEDIMENT EXCAVATED TO 2.5' BLS
- SURFACE SOIL EXCAVATED TO 2.0' BLS
- ROW RIGHT-OF-WAY

0 15 30

SCALE: 1" = 30'

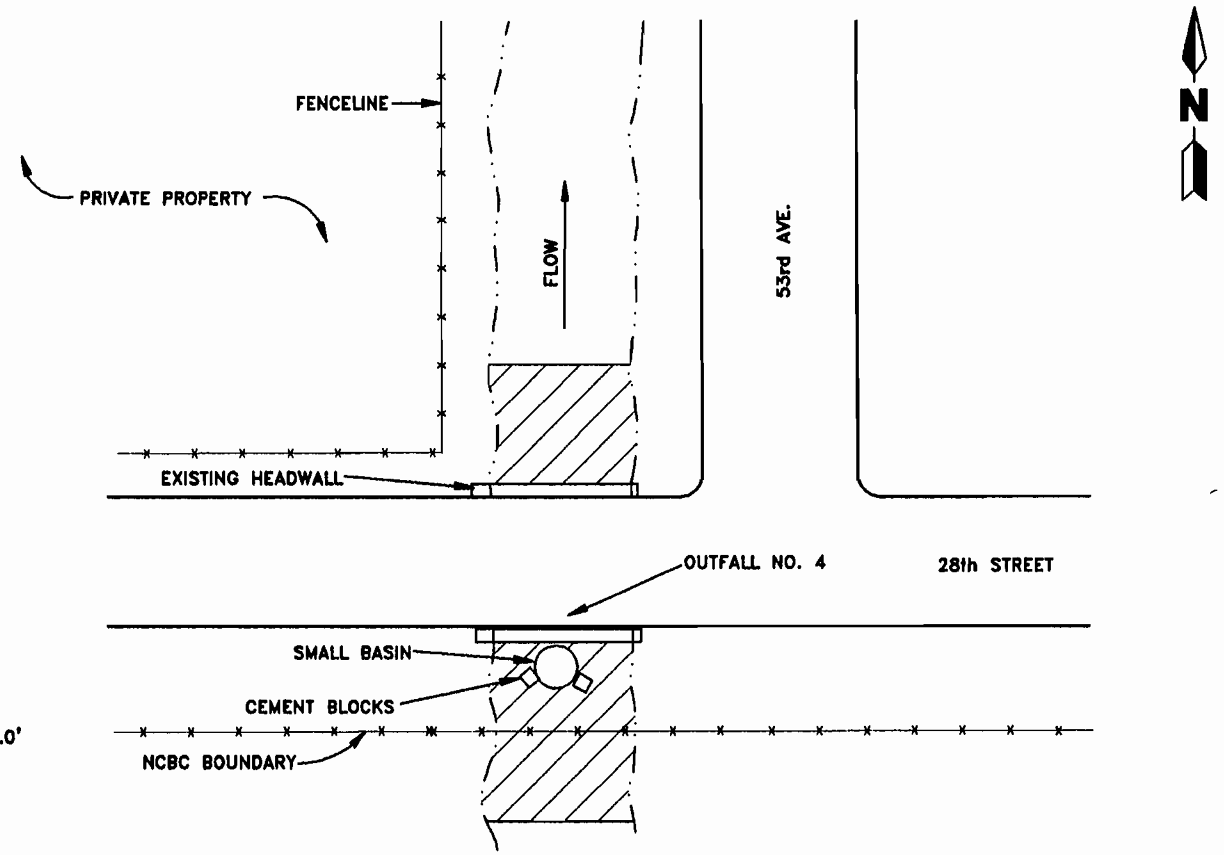
FIGURE 3-4

EXCAVATED AREA AT OUTFALL NO. 3

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_3-4\DMF\960424



LEGEND

SEDIMENT EXCAVATED TO 2.0' BELOW LAND SURFACE

NCBC NAVAL CONSTRUCTION BATTALION CENTER

0 15 30

SCALE: 1" = 30'

FIGURE 3-5

EXCAVATED AREA AT OUTFALL NO. 4

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_3-5\DMF\960424

that sloped to one end. The bottom of the trench was lined with 40-millimeter high density polyethylene (HDPE) to prevent the contact of groundwater with the sediment-containing dioxins. Perforated pipes were installed along the bottom of the trench to allow dewatering of the sediments. The dimensions of the trench were 60 feet wide by 85 feet long. The edge was bermed 3 feet above grade to allow for extra storage capacity and also was lined with 40-millimeter HDPE. A single piece of HDPE was used to cover the entire trench to keep rainwater and surface water from entering the trench and to prevent the erosion of sediment from the sediment-handling area.

4.0 ICMs

The objective of the ICMs is to reduce the transport of contaminated sediment in the storm drainage ditches exiting NCBC. Two ICMs are proposed to achieve this objective. The first ICM to control sediment migration will be to upgrade the existing SRT network by replacing existing SRTs (if needed) and adding new SRTs. The second ICM to control soil erosion will be to install a temporary cover with appropriate drainage controls at Site 8. This ICM may be implemented contingent upon further onsite delineation activities. Together these ICMs should reduce offsite transport of contaminated sediments.

4.1 ICM NO. 1 – UPGRADE SRT NETWORK. Because of high flow rates and surface water flow velocities from storm events, several of the existing SRTs have been washed out or suffered structural damage. Some of them have become blocked with excessive amounts of sediment, causing the stormwater to flow over the top of the SRT. Because of the present condition of the overall SRT network, the following activities are proposed:

1. performance sampling at upgradient and downgradient locations for existing SRTs,
2. a site survey and engineering evaluation of drainage conditions to determine future SRT locations and future SRT design criteria,
3. improved designs for SRTs,
4. replacement of existing SRTs with the improved design (where needed),
5. installation of additional SRTs, and
6. continued performance evaluation of all SRTs.

4.1.1 Description of ICM No. 1 SRTs provide a way to decrease the surface water flow velocity in a ditch, by functioning as a hydraulic obstacle that reduces the flow velocity, where contaminated sediment has time to settle out. SRTs also act as a filter to trap fine-grained sediment that does not settle out upstream of the SRT. The drainage ditches may be widened upstream of the SRT to decrease the amount of kinetic energy the water has by decreasing its velocity. This should allow the sediment more time to settle to the bottom of the ditch. SRTs should reduce transport of contaminated sediments through the drainage pathways on the base. This will be consistent with long-term corrective measures to eliminate exposure pathways which endanger both human health and the environment.

A conceptual description of ICM No. 1 is as follows. SRT locations will be excavated along the stream bottom to remove fine-grained, saturated material. The excavated area will be covered with a geotextile material and large-diameter gravel up to the stream bed elevation. A prefabricated gabion will be placed on top of this prepared surface and anchored to the surface with rebar hooks to increase stability. The ends of the gabions will be anchored into the bank, if needed. The gabion will then be filled with large-diameter gravel. At selected SRT locations, a filter fabric will be placed between the two parallel gabions to act as a filter curtain. The filter fabric will be secured to a metal frame, which is removable for maintenance purposes. Gravel will be placed around the ends of the gabion to prevent washout of the bank. All gabions will be placed perpendicular to the direction of flow. To alleviate flooding or stream overflow, a sheet metal weir may be constructed at the top of gabions where the weir elevation is lower than the bank elevation. See Figure 4-1 for a concept cross section of the SRT design.

After construction is complete on the upgraded SRT network, performance monitoring will be conducted. This monitoring will include taking samples upstream and downstream of all SRTs to assess whether or not contaminated sediments are being deposited upstream and not downstream of the SRTs. Visual monitoring will be conducted on a scheduled monthly basis or more frequently after major storm events to assess the integrity of all SRTs and their ability to withstand increased flow rates and volume of water held upstream. The filter curtain will be checked periodically for excessive buildup, tears, or any other damage that may occur during storm events. Note that the filter curtain will only be placed in one or more downstream SRTs due to fouling considerations. Sediment recovered by the traps will be excavated and stored in the sediment handling area at Site 8, as required to maintain SRT efficiency.

<u>4.1.2 Data Requirements</u> Before replacement of selected existing SRTs or installation of new SRTs, additional data will be collected and evaluated to better understand existing conditions and support design activities. Additional data to be collected and evaluated include the following:

- performance monitoring (i.e., sampling and analysis for dioxin) upstream and downstream of each existing SRT;
- perform a site survey and inspection to identify major drainage ways leading from Site 8 that discharge to outfalls and the contributing areas to those major drainage ways;
- survey drainage-way profiles and determine the cross sectional area to support the upgraded SRT network design; and
- determine drainage way flow velocities and volume using historic rainfall intensity, runoff coefficient, and drainage area data.

<u>4.1.3 Quantity and Handling Procedures for Excavated Material</u> The quantity of material generated by any drainage ditch widening activities or SRT installation activities will be a function of the number of SRT locations, some of which may require widening of the upstream drainage ditch. As discussed in Subsection 4.1.2, a site survey and engineering evaluation of drainage conditions is proposed to determine future SRT locations and SRT design criteria. Once the site survey and engineering evaluation is complete, SRT locations and the associated quantity of excavated material will be determined.

Ditch widening activities are not expected to involve dioxin contaminated material since the excavated soil will primarily be bank material. SRT installation and maintenance may involve some dioxin contaminated material. During SRT installation, ditch bottom is excavated to allow placement of a prepared base for the SRT. During SRT maintenance, the buildup of accumulated

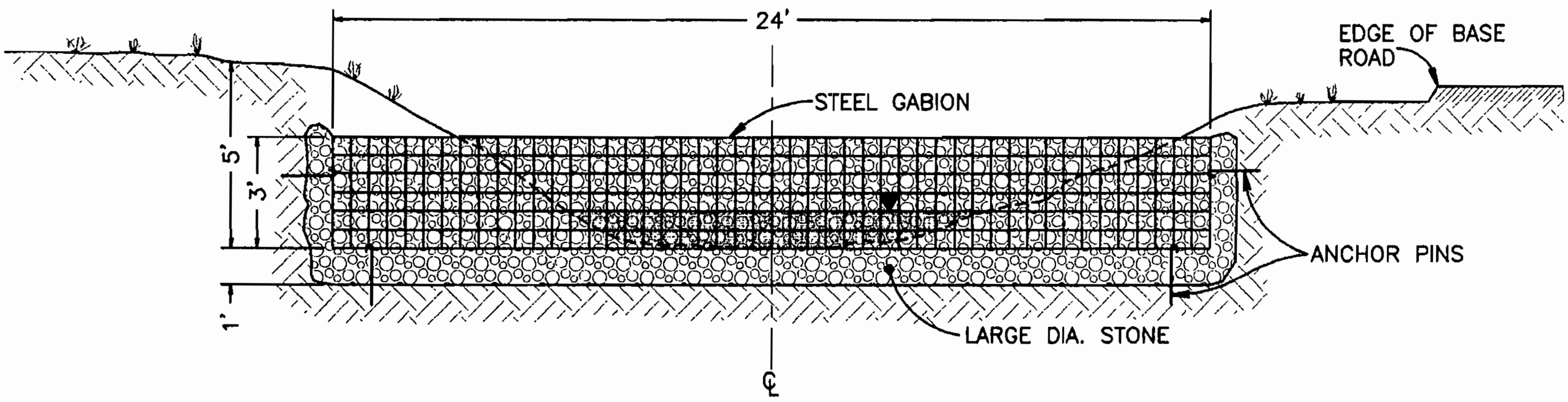


FIGURE 4-1

CONCEPT FOR SEDIMENT RECOVERY TRAP DESIGN

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

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sediment will be removed. Areas of sediment proposed for excavation will be characterized prior to actual excavation activities. Those areas that exceed the action level will have the excavated material stored in the sediment handling area at Site 8.

4.2 <u>ICM NO. 2 – TEMPORARY COVER AND SITE DRAINAGE CONTROL</u>. Based on the site conceptual model presented in Chapter 2.0, erosion of surface soil has been identified as a potential source of contaminated sediment found in the drainage ways leaving Site 8. The surface soil is deposited offsite via stormwater runoff. Installing a temporary cover at Site 8 will abate soil erosion and subsequent sediment transport. Two different types of covers will be evaluated for this site. The first one consists of placing a 40-millimeter low density polyethylene (LDPE) liner over the area of concern, and the second consists of using a biodegradable erosion control blanket.

Before installing a cover, a topographic survey of the site and a grading plan will need to be completed so that a uniform surface can be obtained. To promote surface water runoff and drainage control, the ash will need to be bermed (Figure 4-2) and aligned parallel to the drainage ditches.

It is not expected that the ash will need to be moved beyond the boundary of the present ash piles. Water will be used for dust suppression during construction activities.

In addition to the temporary cover, the drainage pathways leaving the site will be inspected and improved so that stormwater drainage can be controlled and directed. Performance of ICM No. 2 activities will be contingent upon surface soil contamination data gathered during the onsite delineation.

4.2.1 <u>Description of ICM No. 2</u> The first option being evaluated for a temporary cover consists of a 3-ply laminate combining two layers of LDPE and a high-strength cord grid. The nonwoven cord grid provides a uniform loading resistance of over 660 pounds per yard in all directions. The cord reinforcement is in a diamond pattern with a minimum of 48 strands per square foot suspended in a permanently flexible adhesive media to allow fiber slippage. The liner is specifically engineered to provide high strength and durability in a lightweight material. Other features of this cover include the following:

- ultraviolet stabilization, which protects the material from degradation during extended exposure to sunlight;
- cold-crack resistance, which eliminates failure in extremely cold temperatures;
- low permeability, which greatly inhibits moisture transmission; and
- custom manufacturing to the size requested.

The cover will be spread over areas of Site 8 in sections and secured to the ground by either center blocks or metal stakes. The sections will be chosen based on their location and relationship to drainage ditches and the concentrations of dioxin or surface soil.

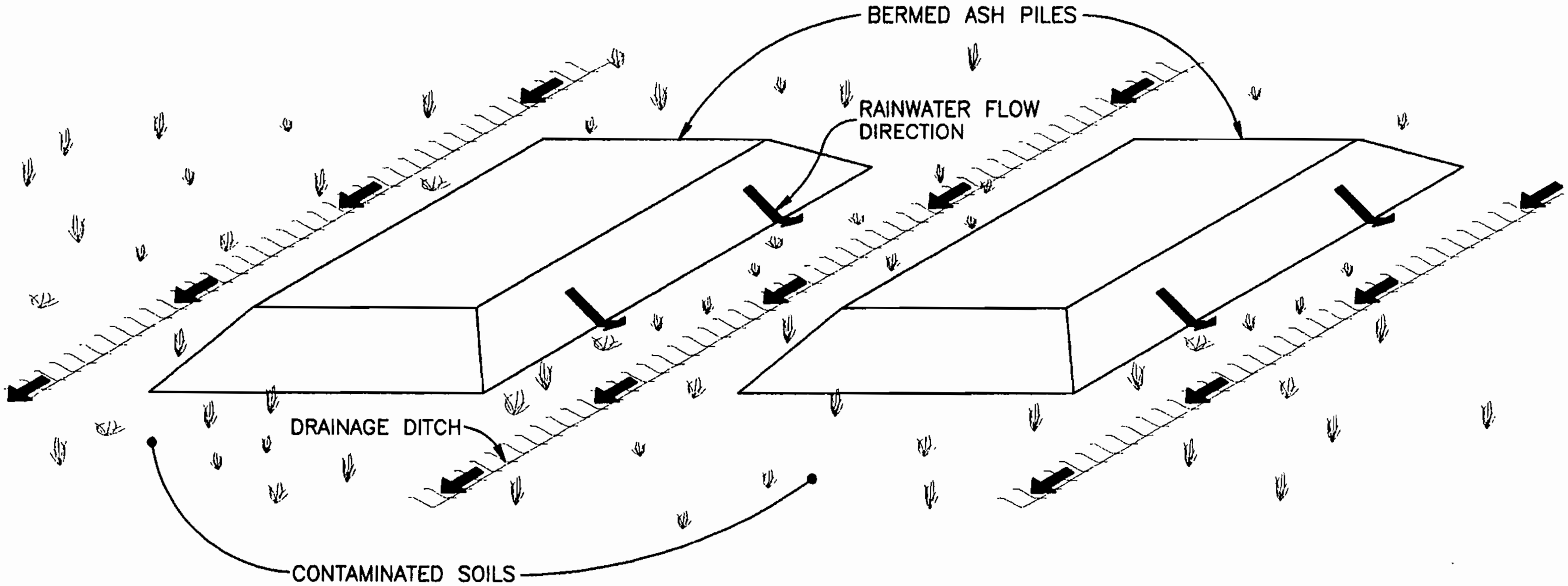

FIGURE 4-2

GRADING PROFILE OF SITE 8 ASH

INTERIM CORRECTIVE
MEASURES WORKPLAN

NAVAL CONSTRUCTION
BATTALION CENTER
GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_4-2\DMF\960424

The second option being evaluated for a temporary cover is an erosion control blanket that utilizes a unique weave of multifilament yarn and tape yarn, which provides a strong barrier against wind and rain erosion. Over time, the tape yarn begins to break down, opening the blanket's weave and permitting uninhibited emergence of plants. The multifilament yarn photodegrades a few months later, leaving a healthy-rooted plant life behind. Its expected breakdown period from the time of installation is approximately 1 year.

The erosion control blanket will be spread over areas of Site 8 in sections and secured to the ground by either metal stakes or center blocks. The sections will be chosen based on their location to drainage ditches and soil contamination levels.

4.2.2 Design Requirements The design requirements for the temporary cover will be to determine the cover sizes required for the different areas to be covered and to develop a grading plan for the existing ash piles. These covers will be provided from manufacturers experienced in the development of these products. Once the topographic survey is complete, berm elevations and slope requirements will be specified to direct stormwater runoff to drainage ditch locations. The location of the drainage ditches are shown on Figure 4-2.

4.3 DESIGN

Design activities will be performed for ICM No. 1 and possibly ICM No. 2. ICM No. 1, Upgrade SRT Network, includes design and future locations for SRTs based on data collected from a site survey and inspection of base drainage ways and drainage areas. ICM No. 2, Temporary Cover and Site Drainage Control, includes design of site grading and drainage controls, which would be performed contingent upon data from the onsite delineation activities.

Design activities are conducted to provide the process, methods, assumptions, and justifications involved in the proposed ICMs. Design activities will be conducted in three steps to include concept, preliminary, and final design. Design activities performed in this manner allow review and approval by interested parties at critical points in the design development.

4.3.1 Concept Design The concept design package will consist of schematic drawings, design criteria, a list of applicable specifications, preliminary cost estimates of the ICM design, and a preliminary schedule for the implementation of the design.

4.3.2 Preliminary Design The preliminary design package will include revisions to the Concept Design Package based on comments received from the USAF, the Navy, and the regulating agencies. This package will consist of an engineering evaluation of the data collected from the site survey and inspection to determine future SRT locations and temporary cover requirements. Critical information necessary to support preliminary design activities includes, but is not limited to, the following:

- survey of Site 8 to determine runoff areas and directions,
- identification of drainage areas contributing to Site 8-related drainage ways,

- determination of a representative runoff coefficient for the drainage areas of interest,

- identification of a design storm event and its associated rainfall intensity, and

- survey of main ditches leaving Site 8 to include ditch profile and cross sectional area.

The primary purpose in collecting the above data is to determine peak runoff, design flow volumes, and ditch capacities. This information will be used to locate additional SRTs. If required, site survey data will also help determine the dimensions and requirements of a temporary cover. These data will also serve as information to be used in evaluating future remedial actions.

4.3.3 Final Design The final design package will consist of revisions to the preliminary design package based on comments received from the USAF, the Navy, and the regulatory agencies. This package will include the basis of design, final drawings, specifications, and a submittal register such that the final design may be used by a construction contractor to install the ICMs.

5.0 PROJECT PLANS

Project plans will be prepared or amended prior to conducting specific ICM-related tasks. The following is a list of project plans anticipated for interim measure activities contained in this workplan:

- Health and Safety Plan
- Sampling and Analysis Plan
- Waste Management Plan
- Data Management Plan
- ICM Installation Workplan
- Construction Quality Plan
- Maintenance Plan
- Performance Monitoring Plan

Several of these plans already exist as a part of previously submitted documents for remedial investigation and feasibility study activities and removal activities conducted at NCBC Gulfport. Other project plans may be combined into a letter format tailored specifically for the task to be undertaken.

6.0 PROJECT SEQUENCE

Activities related to the ICM workplan follow both parallel and sequential tracks with other activities to reach project objectives. A schedule depicting these activities is shown on Figure 6-1. Design plans and related documents will be prepared to present the design approach, SAPs, and health and safety issues.

6.1 REVIEW AND APPROVAL OF THE ICM WORKPLAN. The draft ICM workplan will be delivered to the regulatory agency, MSDEQ, for review and approval. Review comments will be addressed in the final ICM workplan. The ICM workplan becomes final after these comments are addressed.

6.2 PREDESIGN ACTIVITIES. Technical information needed before the design begins include the peak runoff and flow volume of a design storm event, as well as the hydraulic capacity of the drainage ways associated with Site 8. To obtain this information, performance sampling of the existing SRTs and collection of data from a site survey and inspection must be conducted prior to initiation of design activities. This information will provide the basis for the design. The performance sampling of existing SRTs will be documented in a letter report to the Navy and MSDEQ.

6.3 DESIGN ACTIVITIES. As described in Section 4.3, design activities will consist of concept, preliminary, and final design packages. The concept and preliminary design packages will be provided in letter format to the Navy, and the final design package will be provided in report format to the Navy. The design packages will be reviewed by interested parties. Final design will include a basis of design, drawings, specifications, and a submittal register such that the final design may be used by a construction contractor to install the ICM.

6.4 ICM INSTALLATION. Field activities for installation of the ICMs will involve planning and preparation, field equipment organization, and mobilization. Mobilization will include onsite preparation and layout of the SRT locations and areas for temporary cover, as well as improvements to site grading. Utility and access clearances will be coordinated with base personnel. Subcontractor mobilization of support equipment, materials, and supplies will also be performed.

ICM installation activities will include installation of additional SRTs, replacement of selected existing SRTs, and possibly a temporary cover and site drainage control for Site 8. ICM installation activities will be detailed in a letter workplan prepared for review by the Navy and MSDEQ.

6.5 PERFORMANCE EVALUATION. The performance of all SRTs will be evaluated by sampling the sediment immediately upgradient and downgradient of the individual SRTs. Samples will be taken for dioxin and dioxin-related chemicals using USEPA Method 8290 (USEPA, 1986b). Recommended sampling interval is once per quarter. Proposed activities for performance evaluation of all SRTs will be provided in a letter performance monitoring plan submitted for review by the Navy and MSDEQ.

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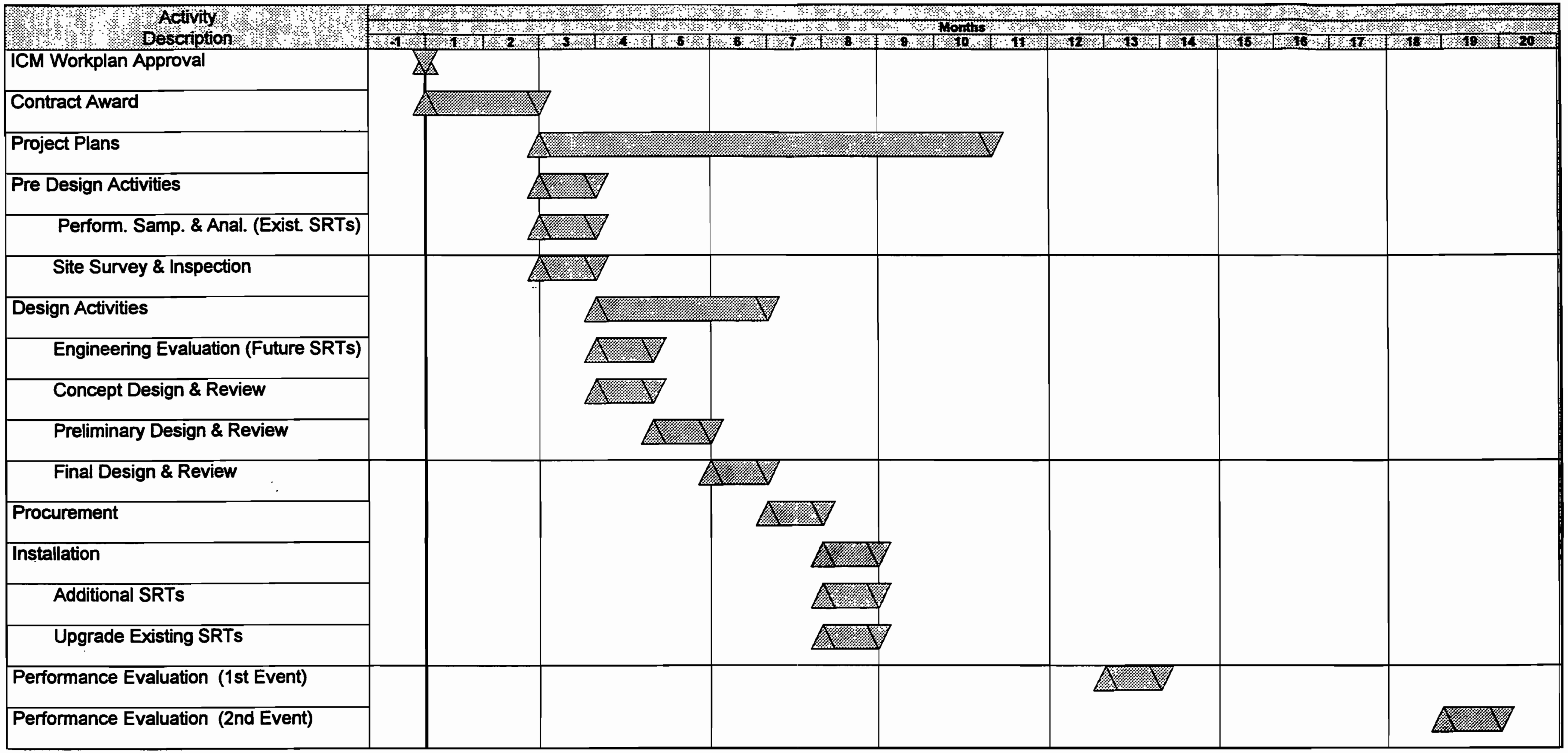

Project Start	**01 May 1996**
Project Finish	
Data Date	**01 May 1996**
Plot Date	**26 April 1996**

FIGURE 6-1

SCHEDULE

INTERIM CORRECTIVE MEASURES WORKPLAN

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

D:\DWG\ABB\08505-18\ICM_WKPL\FIG_1-4\DMF\960424

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