N62604.AR.001545
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DECISION DOCUMENT SITE 8 FORMER HERBICIDE ORANGE STORAGE AREA AND ASSOCIATED AREAS NCBC GULFPORT MS

12/1/2004

NCBC GULFPORT

Decision Document

Site 8, Former Herbicide Orange Storage Area and Associated Areas
Naval Construction Battalion Center
Gulfport, Mississippi

December 2004

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Appendix - Figures

ACRONYMS AND ABBREVIATIONS

%	percent
AASHTO	American Association of State Highway Officials
ABB-ES	ABB Environmental Services, Inc.
AO	Agreed Order
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
DA	Drainage Area
DD	Decision Document
EPM	Environmental Project Manager
FFS	Focused Feasibility Study
H20	Highway 20
HAZWRAP	Hazardous Waste Remedial Actions Program
HLA	Harding Lawson Associates
HO	Herbicide Orange
HRS	Hazard Ranking System
ICM	Interim Corrective Measure
LTM	long-term monitoring
MDEQ	Mississippi Department of Environmental Quality
MS	Mississippi
NCBC	Naval Construction Battalion Center
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPW	net present worth
O&M	operation and maintenance
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
ppb	parts per billion

ACRONYMS AND ABBREVIATIONS, CONT.

ppt	parts per trillion
PRG	preliminary remediation goal
PRSC	post removal site control
RAB	Restoration Advisory Board
RAO	remedial action objective
RGO	remedial goal option
RME	reasonable maximum exposure
SARA	Superfund Amendments and Reauthorization Act
SRT	Sediment Recovery Trap
TBC	to be considered
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TEQ	Toxic Equivalent
TRG	Target Risk Goal
TtNUS	Tetra Tech NUS, Inc.
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USN	United States Navy
yd^3	cubic yard

1. DECLARATION

1.1 SITE NAME AND LOCATION

Site 8 and Associated Areas are located on or adjacent to the Naval Construction Battalion Center (NCBC), in the western part of the city of Gulfport, Harrison County, Mississippi (MS) (Figure 1-1, App-1). The base occupies 1100 acres and is situated approximately one mile north of the Gulf of Mexico and one mile west of United States Highway 49. Site 8 is a 31-acre tract of land located in the central area of NCBC that formerly stored Herbicide Orange (HO). "Associated Areas" refers to the system of drainage ditches and drainage areas located on and off base that receive surface water outflow from the site. The on-base portion of Site 8 is divided into Area A, Area B, and Area C (Figure 1-2, App-2). The off-base "Associated Areas" consist of: Area 1 - two private properties belonging to Mr. Arndt and Mr. Bennett; Area 2 - private property belonging to Mr. Edwards; and, Area 3 - a small tract of land directly east of the base, centered on Brickyard Bayou, and just west of Highway 49. NCBC's primary mission is Seabee training, the support of four battalions of the Naval Construction Force, and the storage and maintenance of pre-positioned War Reserve Material.

1.2 STATEMENT OF BASIS AND PURPOSE

This Decision Document (DD) presents the selected remedy for Site 8 and Associated Areas at NCBC. Off-base Areas 1 and 2 are classified as "wetlands." The properties belonging to Arndt and Bennett (Area 1) will be remediated under the state of Mississippi Brownfields Program. The off-base property belonging to Mr. Edwards (Area 2) has already been remediated to meet State of Mississippi residential standards for dioxin via an interim removal action that was part of the Pilot-Scale Soil/Sediment Treatability Study (TtNUS. 2001c). Remediation of Area 1 will include the excavation of contaminated soil/sediment and combining that material with the soil/sediment excavated from contaminated on-base areas for eventual landfilling at Area A, on-base. The selected remedy for Site 8 was chosen in accordance with the Comprehensive Environmental Response and Conservation Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This DD is based on the Focused Feasibility Study (FFS) and the Proposed Plan (PP) for Site 8 and Associated Areas on file at the Gulfport Public Library. The State of Mississippi (represented by the Mississippi Department of Environmental Quality [MDEQ]) concurs with the selected remedy as evidenced by their approval of the Final Focused Feasibility Study for Site 8 (TtNUS. 2001b).

1.3 ASSESSMENT OF SITE

The response action selected in this DD is necessary to protect the public health, welfare, and the environment from actual or threatened releases of hazardous substances into the environment. The source materials to be remediated include the soil ash, soil, and sediments impacted by HO above the preliminary remediation goals (PRG) for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and dioxin congeners (usually reported in Toxic Equivalents [TEQ] relative to the toxicity of TCDD) (Table 1-1)

Table 1-1
Preliminary Remediation Goals for
Dioxin at Site 8

Area	Unit	PRG	PRG Source
On-base Site 8 surface soil, ash, and sediments	ppt	38	MDEQ Tier 1 TRG (restricted)
On-base non-Site 8 surface soil and sediment	ppt	38	MDEQ Tier 1 TRG (restricted)
Off-base soil (Area 2)	ppt	38	MDEQ Tier 1 TRG (restricted)
Off-base sediment, shallow water (Area 1)	ppt	38	MDEQ Tier 1 TRG (restricted)
Off-base sediment, deep water (Area 3)	ppt	1,000	Human health risk-based value for construction worker (HLA 2001)

HLA Harding Lawson Associates
MDEQ Mississippi Department of Environmental Quality
ppt parts per trillion
PRG preliminary remediation goal
TCDD 2,3,7,8-tetrachlorodibenzo-p-dioxin
TRG target risk goal

1.4 DESCRIPTION OF SELECTED REMEDY

The selected remedy is a compilation of various remedial technologies including excavation, landfilling, treatment/stabilization, capping, land use controls, and long-term monitoring (LTM). These remedial technologies are discussed below:

- Excavation: consists of removing contaminated sediments, soil, and soil ash from contaminated areas using a backhoe or other similar excavation equipment.

- Landfilling: consists of dewatering (draining the water from) the excavated sediments by stockpiling, then mixing the dewatered sediments with excavated soil, soil ash, and other construction debris at Area A (Figure 1-2, App-2) to produce a material blend.

- Treatment and Chemical Stabilization: consists of mixing the material blend with cement to create a lattice network that limits the mobility of dioxins and improves the

geotechnical characteristics of the material mixture, making it more suitable for use as structural fill.

- Capping: consists of placing a cover system over the entire area where the stabilized material mix has been laid down. The cover system will be designed in accordance with the American Association of State Highway Officials (AASHTO) Highway 20 (H20) specifications; it will be constructed using rolled, compacted concrete or some other suitable material that will allow the capped area to be used for storage of heavy equipment.

- Land use controls and LTM: Land use controls and a long-term monitoring program will be used to ensure the long-term effectiveness of the remedial action.

The selected remedy eliminates unacceptable risks to human health and the environment by excavating heavily impacted source materials (i.e., soil ash, soil, and sediments) and consolidating them into a single, access-restricted location, and by reducing the mobility of dioxins in these materials through chemical stabilization and landfill capping. Land use controls and LTM provide additional protection by ensuring that the selected remedy continues to be protective of human health and the environment.

The major components of the selected remedy include:

- Excavating soil, soil ash, and sediment from Areas B and C, on-base surface drainage ditches, and the off-base Brownfields Property (i.e., the Arndt and Bennett properties). The excavated material will be transported to a staging area located at Area A. Soil/sediment excavated from the off-base Edwards property has already been placed on Area A. During excavation work, surface water flow in the drainage ditches will be controlled to prevent any migration of contaminated sediments.

- Installing erosion, sediment, and stormwater control devices (e.g., sheet piling and silt fences) to prevent erosion of contaminated soils and sediments and utilizing pumping methods to divert surface water from areas of sediment excavation.

- Dewatering wet sediment by static stockpiling; all dewatering products will be analyzed and disposed of in accordance with all applicable laws and regulations.

- Blending soil ash, soil, and dewatered sediments with Portland Cement for stabilization and placement of the stabilized material in 10-inch thick lifts spread over Area A.

- Capping the stabilized materials with a 12-inch rigid pavement cap designed in accordance with AASHTO H20 specifications, or equivalent alternative specifications appropriate for rolled, compacted concrete. Any additional fill brought on site to prepare

the landfill cap or to grade excavated areas will be tested to ensure acceptable environmental quality before use.

- Restricting access to the Site 8 landfill and to associated on-base areas that have not been remediated to MDEQ unrestricted levels.
- Restoring impacted swampland located off base to meet or exceed, if possible, industrial land use residual risk restrictions for the Brownfields Property.
- LTM of Site 8 and Associated Areas except for the Brownfields Property.

1.5 STATUTORY DETERMINATIONS

The selected remedy will eliminate the potential for exposure to dioxin by 1) removing contaminated soil, soil ash, and sediment, 2) stabilizing and containing the excavated material within an on-base landfill, 3) providing a warning in the unlikely event of migration of dioxin from the landfilled material to groundwater, and 4) preventing any future site development that would compromise the structural integrity of the landfill.

The MDEQ concurred with the Proposed Plan (PP) which identified the selected remedy as the Preferred Alternative for the remediation of HO contamination at Site 8 and Associated Areas during the meeting held with the United States Navy (USN) and United States Air Force (USAF) on February 14, 2002 in Jackson, MS. The PP, identifying the selected remedy as the Preferred Alternative, was presented at the public meeting held on April 4, 2002. The public accepted the PP based on the comments received during the public meeting and during the public comment period.

In summary, the selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Because the selected remedy will result in a contaminant (dioxin) remaining on-site above levels that allow for unlimited use and unrestricted exposure, a program review will be conducted with MDEQ within five years of completion of the construction portion of the selected remedy to ensure that the remedy is, and will continue to be, protective of human health and the environment.

2. DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

Site 8 and Associated Areas are located at NCBC, in the western part of the city of Gulfport, Harrison County, MS. The base occupies 1100 acres and is situated approximately one mile north of the Gulf of Mexico and one mile west of United States Highway 49. Site 8 is a 30-acre tract of land located in the central area of NCBC that formerly stored HO. "Associated Areas" refers to the system of drainage ditches located on and off base that received surface water outflow from the site. NCBC's primary mission is Seabee training, the support of four battalions of the Naval Construction Force, and the storage and maintenance of pre-positioned War Reserve Material.

The remedial action at the NCBC Site 8 and Associated Areas is currently administered by the USN and the USAF, in conjunction with the MDEQ and the United States Environmental Protection Agency (USEPA) Region IV, in accordance with the State of Mississippi's Joint Agreed Order (AO) No. 3466-97 (the "AO") issued in November 1997. Both the USAF and the USN are responsible for funding this remedial action.

From 1968 through 1977, the USAF used a 30-acre area located at the central portion of NCBC Gulfport for storage and handling of HO contained in 55-gallon drums. Interviews with workers at NCBC Gulfport indicated that spills and leaks were common results of drum ruptures and re-drumming activities within the storage area. In June of 1977 remaining stocks of HO (approximately 850,000 gallons) were de-drummed and loaded onto a disposal ship for subsequent incineration at sea. During the 1980s, the USAF initiated remediation activities at the former HO storage area. The site was designated Installation Restoration Program Site 8 and divided into Areas A, B, and C and Associated Areas (Figure 1-2, App-2).

The off-base Arndt, Bennett, and Edwards private properties are classified as wetlands. The United States Army Corps of Engineers' definition of wetlands is, "...those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (33 Code of Federal Regulations [CFR] 328.3(b); 40 CFR 230.3(t)).

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The HO liquid inventory was removed and destroyed in 1977 in compliance with a permit obtained from the USEPA. Committed to a follow-on storage site reclamation and environmental monitoring program, the USAF initiated an investigation to determine the magnitude of HO releases at Site 8. The results of the Initial Monitoring Program (Hazardous Waste Remedial Actions Program [HAZWRAP] 1991) conducted in 1984

confirmed that surface soil was contaminated with the two herbicide components of HO and with a specific dioxin congener - TCDD. TCDD, an impurity present in the HO mixture, was detected in the surface soil and sediments as well as in biological specimens including snails, fish, tadpoles, crayfish, and insects collected from the drainage ditches associated with Site 8. Based on these results, a Comprehensive Soil Characterization Study was conducted from 1984 through 1986 to determine the extent of HO and dioxin contamination (EG&G 1988). Results of this study indicated maximum dioxin concentrations of 1,000 parts per billion (ppb) confined in surface soil to a depth of 2 feet below ground surface; dioxin concentrations decreased with depth.

Between 1987 and 1988, the USAF excavated an estimated 27,000 cubic yards (yds^3) of soil containing dioxin at concentrations greater than 1 ppb. The excavated soil was incinerated on site and the residual soil ash piles were stored on Area A. Results from an off-site soil dioxin contamination study confirmed off-site migration of TCDD (EG&G 1988). Analytical results of soil ash pile samples indicated dioxin concentrations that ranged from non-detect to 60 parts per trillion (ppt) (ABB Environmental Services, Inc. [ABB-ES] 1997).

Sediments that contained measurable concentrations of dioxins were detected at a maximum depth of 3 feet below grade at Outfalls 1, 3, and 4 in soil samples collected during the Defense Construction Roadway project along 28th Street (in mid-1995). An Interim Removal Action was conducted in 1995 when the contaminated sediments were excavated and placed on Site 8, Area A with the approval of MDEQ (ABB-ES 1995). Two follow-on Interim Corrective Measures (ICM) were implemented between 1995 and 1997 to control migration of contaminated sediments in the storm drainage ditches that exit the Base. The ICMs involved the installation and upgrade of 15 Sediment Recovery Traps at various entrance points to and along the on-base drainage channels associated with Site 8 and the installation of temporary cover and appropriate drainage controls to curtail soil erosion and off-site migration of stored sediments at Site 8.

As required by the AO, a human health risk assessment and screening level ecological risk assessment at Site 8 was conducted at off-base areas. The risk assessment characterized risks to human health and ecological species associated with potential exposures to HO-related chemical compounds present in sediments and surface waters migrating from Site (Harding Lawson Associates [HLA] 2001). This study evaluated all available dioxin and furan data (as TCDD TEQs) on areas associated with the Base, with the exception of the swamp area north of Outfall 3. The study determined that on-base risks to human receptors were "acceptable" provided that future use scenarios precluded residential development and access to Site 8 (as it currently exists) was restricted. However, since future land use is uncertain, remedial goal options (RGO) were developed for each affected media type and receptor scenario, including residential scenarios. These RGOs were later assessed during the FFS (Tetra Tech NUS, Inc. [TtNUS] March 2003) to determine PRGs for both on-site and off-site areas associated with Site 8, including off-base Areas 1 and 2 north of Outfall 3 and off-base Area 3 to the east of the Base (Figure 2-1, App-3).

In February 2001, the USAF and USN proposed to remediate off-base Area 1 (the Arndt/Bennett properties) contaminated with dioxin from the HO storage site under the Mississippi Brownfields Program. Under this program, the contaminated properties will be remediated to risk-based criteria that are protective of human health and the environment, allowing the properties to be developed and put to productive use expeditiously.

In March 2003, the USAF and USN submitted an FFS to MDEQ and USEPA Region IV in compliance with CERCLA and the AO. The FFS summarized the preferred alternative to clean up Site 8 and Associated Areas, as well as other remedial alternatives that were considered.

2.3 COMMUNITY PARTICIPATION

The FFS Report and the PP for Site 8 were made available to the public on April 4, 2002. The reports can be found in the Administrative Record file maintained at the NCBC Environmental Office as well as in the information repository located at the Harrison County Public Library (1300 21st Avenue, Gulfport, MS 39501). The notice of availability of these two documents and other Site 8 investigation reports for public review was published in the Sun Herald newspaper on March 18, March 31, and April 2, 2002. On April 4, 2002, a public meeting was held at the Isiah Fredericks Community Center in Gulfport. The public comment period was took place from April 4 to May 4, 2002; it was later extended by public request to June 7, 2002. Comments received during this period and the USN/USAF's responses to these comments are presented in the Responsiveness Summary (Section 3.0) included as part of this DD.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

The selected remedy described in this DD is the final action for Site 8 and contiguous drainage ditches. The remedial action objectives (RAO) for Site 8 soil and sediment are: (1) to protect human health from the carcinogenic and non-carcinogenic risks associated with incidental ingestion, inhalation of, and dermal contact with dioxin-contaminated soil and sediment, and (2) to comply with State and Federal applicable or relevant and appropriate requirements (ARAR) and to be considered (TBC) guidance criteria. Through removal, chemical stabilization, and containment technologies, in combination with land use controls, the preferred remedial alternative will permanently reduce the mobility of the principal threat wastes and eliminate unacceptable risk at Site 8 and contiguous drainage ditches.

2.5 SITE CHARACTERISTICS

2.5.1 Overview

The risk assessment for Site 8 risk was conducted from 1997 to 1999 as part of the Site 8 Remedial Investigation and as required by the AO (HLA 2001). The Site 8 Risk Assessment Report (HLA 2001) describes the full details of the conceptual site model (CSM), geographic features pertaining to contaminant transport, sampling strategies utilized during the risk assessment, types of contamination and the affected media, and potential contaminant migration routes. The following is a brief overview of these items as they relate to this DD.

2.5.2 Source Area and Transport Information

The source of the dioxins in soil at NCBC is the former HO storage area at Site 8. Site 8 was subdivided into Areas A, B, and C. (Figure 1-2, App-2). Area A is 13 acres in size and is currently used as a containment/storage area for the soil ash generated by the incineration of dioxin-contaminated soil in 1987 to 1988, soil excavated from drainage ditches, and other construction debris. Areas B and C both contain patches of surface soil contaminated with low levels of dioxin. The transport and receiving media include surface soil at Site 8 and sediments in the associated ditch systems. Surface water and groundwater were not found to be significant transport media (HLA 2001).

The FFS identified two off-base areas (Area 1 and Area 2) with media containing dioxins at concentrations that exceeded the respective media PRGs (TtNUS 2001). Areas 1 and 2 are both located north of NCBC, east of Canal No. 1, and adjacent to South Branch Turkey Creek just prior to its confluence with North Branch Turkey Creek (Figure 2-1, App-3).

Following the remedial activities completed in 1988, the most significant source of dioxins remains the bedload sediments in the ditch systems hydraulically connected to Site 8. The Site 8 Risk Assessment Report contains full details of the sampling activities and analytical results associated with these areas (HLA 2001).

2.5.3 Geology

Geologic units in the vicinity consist of Quaternary sediments. The oldest unit, the Citronelle Formation, consists mostly of sand and gravel interspersed with layers of clay. Terrace deposits consisting of sand and gravel overlie the Citronelle Formation. Surface deposits are typically alluvial gravels and sands that grade to sandy clays and silts in some areas; the deposits are rich in organic debris near the tidal marshes.

Native surface soil at of Site 8 ranges from silty loam to loamy sand. During construction activities in 1942, the surface soil at Site 8 was treated with cement and compacted, forming a 6- to 12-inch layer of hardened, stabilized surface ideal for outdoor

storage. Areas A, B, and C in Site 8 have re-vegetated with native plants. Off-base Areas 1 and 2 are wetlands primarily comprised of forest and swampland.

2.5.4 Hydrogeology

The majority of NCBC is located in the 76-square mile Bernard Bayou watershed that eventually drains into Biloxi Bay. Overland flow from Areas A and B travels primarily to the north through a system of base drainage ditches via Outfalls 3 and 4 to Canal No. 1. Canal No. 1 flows into South Turkey Creek, which joins with North Turkey Creek and then with Bernard Bayou to the northeast of Gulfport/Biloxi Regional Airport. Overland flow from Area C travels primarily toward the south and then east where it flows via Outfall 2 (south) into Brickyard Creek, which flows toward the northeast where it becomes Brickyard Bayou prior to joining with Bernard Bayou to the east of Gulfport/Biloxi Regional Airport.

During performance of the Site 8 risk assessment, NCBC was divided into six drainage areas based upon the results from previous hydrogeologic assessments (HLA 2001). The drainage areas associated with Site 8 include Drainage Area (DA) 1 (associated with runoff from Area A), DA 2 (associated with runoff from Area B), and DA 3 (associated with runoff from Area C) (Figure 2-2, App-4).

2.5.5 Conceptual Models

Conceptual models were developed during the Site 8 risk assessment that summarized the potential exposure pathways by which people could be exposed to HO-affected media (HLA 2001). Figures 2-3 and 2-4 (App-5 and App-6) depict the CSMs used to assess the risk of human health exposure to on and off-base contamination, respectively. The groundwater pathway is not considered a potential pathway for exposure to TCDD emanating from Site 8 (TtNUS 2001). The primary transport mechanism for HO from Site 8 to off-base locations was determined to be the bed load sediments in the ditch system. The sediments impacted of swampland adjacent to the water body formerly leading from Outfall 3 north of the base to Turkey Creek (HLA 2001). Outfall 3 was redirected to Canal No. 1 in 1996 and no longer discharges to the Brownfields Property (HLA 1999). Groundwater contamination was assessed in 1997-1998 by the Phase I and Phase II Surface Water and Sediment Dioxin Delineation studies (HLA 1999). HO was eliminated as the source of TEQ detections in groundwater based on these studies as well as earlier studies by ABB-ES (ABB-ES 1995) due to the absence of TCDD (HLA 1999). These studies also established the relationship between total organic carbon and the presence of TCDD, concluding that surface water was not a major transport mechanism for TCDD (HLA 1999).

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

A land use survey was included in Appendix E of the Site 8 risk assessment report as part of the Ecological Assessment Sampling Checklist (HLA 2001). The current uses of on-base and off-base lands surrounding Site 8 were reported as follows.

The NCBC Gulfport facility currently consists of developed areas and buildings that support the base mission. Areas are categorized as 1) improved grounds (landscaped and mowed), 2) semi-improved grounds (erosion control, weed control, fire hazard reduction maintenance), 3) unimproved grounds, and 4) other (buildings and paved areas). NCBC Gulfport contains both industrial use areas and NCBC personnel residential use areas. Approximately 15 percent (%) of the total area is devoted to forest management (HLA 2001). Site 8 is currently used to store construction debris, ash from the 1988 dioxin burn, and dioxin-contaminated sediments that were excavated from on-base drainage ditches and the off-base Edwards property. Land use in the vicinity of the NCBC Gulfport facility is multipurpose: residential, commercial, light industrial, and open space (jurisdictional wetlands). Land use along the two main water body corridors leading to the northwest (Turkey Creek) and southeast (Brickyard Bayou) is primarily residential and open space (HLA 2001).

NCBC is an active base and future land use at the base is considered to be industrial. Future land use for the dioxin-contaminated private property north of Outfall 3 is expected to be industrial-commercial based on the Mississippi Brownfields Redevelopment Program. The Brownfields Redevelopment Program accelerates the productive use of properties by tailoring environmental cleanup to fit current and/or future land use. Future land use for the private property southeast of the base will most likely continue to be multipurpose.

2.7 SUMMARY OF SITE RISKS

The response action selected in this DD is necessary to protect the public health, welfare, and environment from actual or threatened releases of hazardous substances into the environment. TCDD and dioxin congeners (collectively referred to in this DD as dioxins) are the chemicals of concern at Site 8 (including on-base Areas A, B, and C, as well as impacted on-base ditch systems and off-base areas connected to the base ditch systems) (Figure 2-3, App-5).

The Site 8 risk assessment focused on health effects that might result from current and future direct contact with contaminated soil and sediment through ingestion and dermal contact. The risk assessment considered on-base residents in a residential setting as well as occupational and excavation workers in an industrial setting. The risk assessment included performance of a Community Survey and Exposure Assessment that collected site-specific data to determine potential human exposure pathways to the chemicals of concern. In addition, both on and off-base dioxin contamination were delineated in both surface water and sediment. Divided into two phases, this delineation provided the

majority of the analytical data used to support the risk assessment (HLA 1999, 2001). Data from the risk assessment studies were analyzed prior to developing any remediation plans to determine the probability that public health, welfare, and the environment might be affected due to exposure to dioxin-contaminated soil, sediment, or surface water migrating from Site 8.

2.7.1 Human Health Risks

The statistical analysis of analytical data determined the reasonable maximum exposure (RME) concentrations of dioxins in on-base soil (99.5 ppt), on-base sediment (365 ppt), off-base soil (79 ppt), and off-base sediment (30 ppt). Table 2-1 depicts the RME concentrations associated with individual lifetime cancer risks due to ingestion, dermal contact, and fugitive dust inhalation under current and future land use scenarios. These RME concentrations indicate a significant potential risk to children, adults, trespassers, and site workers (occupational or excavation workers) from direct exposure to contaminated soil and sediment. These risk estimates were based on RME scenarios that used conservative assumptions. Conservative assumptions were made regarding the frequency and duration of an individual's exposure, the dioxin-contaminated media (i.e., soil, soil dusts, and sediment), as well as dioxin toxicity values.

2.7.2 Ecological Risks

Fifty-six biological samples (including whole fish and fillets) were collected and analyzed for dioxins. The data set included most of the edible species found in the study area (i.e., largemouth bass, catfish, striped mullet, and bluegill). None of the HO-related chemical compounds was detected in these samples at concentrations that exceeded the MDEQ Tier 1 screening levels or the USEPA risk-based concentrations. The potential for significant ecological impacts was eliminated based on these data (HLA 2001).

2.8 REMEDIAL ACTION OBJECTIVES

The RAOs identified for Site 8 soil and sediment are as follows:

RAO 1: Protect human health from carcinogenic and non-carcinogenic risks associated with incidental ingestion of, inhalation of, and dermal contact with contaminated surface soil and sediment.

RAO 2: Comply with Federal and State ARARs in accordance with accepted USEPA and MDEQ guidelines (Table 2-2).

Adherence to these RAOs in the development, selection, and implementation of the final remedial alternative will ultimately lead to the immobilization of dioxins in soil and sediments at Site 8 as well as a subsequent reduction in human health risk (HLA 2001).

Table 2-1
Summary of Human Health Risks
Current and Potential Future Land Use Scenarios

Receptor	Media of Concern	Exposure Route	Cancer Risk Based on RME Concentrations
Current Land Use			
On-base Receptors			
Total Resident	Non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	3.0×10^{-5}
Total Trespasser	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	6.0×10^{-6}
Occupational Worker	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	7.0×10^{-6}
Site Worker	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	2.0×10^{-6}
Excavation Worker	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	7.0×10^{-6}
Off-base Receptors			
Total Resident	Off-base sediment	Ingestion and dermal contact	8.0×10^{-7}
Total Trespasser	Off-base sediment	Ingestion and dermal contact	2.0×10^{-7}
Occupational Worker	Off-base sediment	Ingestion and dermal contact	1.0×10^{-7}
Occupational Worker	Off-base deep water sediment, Area 3	Ingestion and dermal contact	6.0×10^{-8}
Site Worker	Off-base sediment	Ingestion and dermal contact	8.0×10^{-8}
Excavation Worker	Off-base sediment	Ingestion and dermal contact	4.0×10^{-8}
Future Land Use			
On-base Receptors			
Total Resident	Non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	6.0×10^{-5}
Total Trespasser	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	6.0×10^{-6}
Occupational Worker	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	7.0×10^{-6}
Site Worker	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	2.0×10^{-6}
Excavation Worker	Site 8 soil, non-Site 8 soil, on-base sediment	Ingestion, dermal contact, and fugitive dust inhalation	7.0×10^{-7}
Off-base Receptors			
Total Resident	Off-base sediment	Ingestion and dermal contact	8.0×10^{-7}
Total Trespasser	Off-base sediment	Ingestion and dermal contact	2.0×10^{-7}
Occupational Worker	Off-base sediment	Ingestion and dermal contact	1.0×10^{-7}
Occupational Worker	Off-base deep water sediment, Area 3	Ingestion and dermal contact	6.0×10^{-8}
Site Worker	Off-base sediment	Ingestion and dermal contact	8.0×10^{-8}
Excavation Worker	Off-base sediment	Ingestion and dermal contact	4.0×10^{-8}

Exposure Route — the known pathway through which a foreign substance could enter the human body
RME — reasonable maximum exposure

Table 2-2
ARARs and TBC Criteria

Name and Regulatory Citation	Description	Consideration in the Remedial Action Process	Type
Federal			
USEPA Region III Risk-Based Concentration Table	Provides risk-based concentrations for screening of soil	Relevant and Appropriate. These guidelines aid in the screening of chemicals in soil.	Chemical-specific
CERCLA and the NCP Regulations (40 CFR, Section 300.430)	Discusses the types of land use controls to be established at CERCLA sites.	Applicable. These requirements may be used as guidance in establishing appropriate land use controls at Site 8.	Action-specific
OSHA (29 CFR Part 1910)	Requires establishment of programs to ensure worker health and safety at hazardous waste sites.	Applicable. These requirements apply to response activities conducted in accordance with the NCP. During the implementation of any remedial alternative for Site 8, these regulations must be followed.	Action-specific
Hazardous Materials Transportation Act Regulations (49 CFR 171-179)	Provides requirements for packaging, labeling, manifesting, and transporting hazardous materials.	Applicable. If soil is excavated and transported and is found to be hazardous, the soil would need to be handled, manifested, and transported as a hazardous waste.	Action-specific
National Emissions Standards for Hazardous Air Pollutants (40 CFR Part 61)	Standards promulgated under the Clean Air Act for significant sources of hazardous air pollutants.	Relevant and Appropriate. Remedial Action (e.g., soil excavation) may result in release of hazardous air pollutants.	Action-specific
RCRA Treatment Storage, and Disposal of Hazardous Waste (40 CFR 262-266)	Regulates the treatment, storage, and disposal of hazardous waste.	Relevant and Appropriate. Hazardous waste generated by site remediation must meet RCRA generator and treatment, storage, or disposal requirements.	Action-specific
Land Disposal Restrictions (40 CFR Part 61)	Restricts certain listed or characteristic hazardous waste from placement or disposal on land without treatment	Relevant and Appropriate. Excavated soil or treatment residuals (such as spent granular activated carbon) may require disposal in a landfill.	Action-specific
Section 404, Clean Water Act	Authorizes the Secretary of the Army, acting through the Corps of Engineers, to issue permits for the discharge of dredged or fill material into the waters of the United States, including wetlands. The objective of the Act is to maintain and restore the chemical, physical, and biological integrity of the waters of the United States.	Relevant and Appropriate. Any construction or remediation activities in a federally listed wetland will require a Section 404 permit unless listed as exempt in section 404(f).	Action-specific
State			
MDEQ TRGs (MS Code Section 49-35-21)	Default Screening Levels. Human Health risk-based cleanup goals for soil.	Applicable. These regulations apply to all remedial actions in the State of Mississippi.	Chemical-specific
MDEQ Risk Evaluation Procedures for Voluntary Cleanup and Redevelopment	Risk-based procedures and rationale for site evaluation and remediation.	TBC. These regulations apply to all Voluntary Cleanup and Brownfield actions in the State of Mississippi.	Guidance
MDEQ Office of Pollution Control Hazardous Waste Management Regulations	Adopts by reference, specific sections of the Federal Hazardous Waste regulations.	Relevant and Appropriate. These regulations may apply if material is removed from the Base.	Action-specific.

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	OSHA	Occupational Safety and Health Administration
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
MDEQ	Mississippi Department of Environmental Quality	TBC	to be considered
MS	Mississippi	TRG	Target Risk Goal
NCP	National Oil and Hazardous Substances Pollution Contingency Plan	USEPA	United States Environmental Protection Agency

Source: *Focused Feasibility Study* (Tetra Tech 2001b)

The MDEQ provides Target Remedial Goals (TRG) in MS Code §§49.35.21 that apply to all cleanup sites in the state of MS. The MDEQ also provides guidance in *Risk Evaluation Procedures for Voluntary Cleanup and Redevelopment of Brownfield Sites* (MDEQ 1999). Since one of the two developed alternatives includes use of the Brownfields Redevelopment Program for off-base lands (TtNUS 2001), the Tier 1 TRG (restricted land use value) for TCDD in soil is applicable to off-base lands subjected to the program.

The Tier 1 TRG (restricted) for soil (38 ppt) is more protective than the risk-based value calculated for occupational worker exposure to soil (50 ppt), on-base residential exposure to soil (42 ppt), and occupational worker exposure to sediments (102 ppt) (HLA 2001, TtNUS 2001). The TRGs listed in MDEQ 1999 are specific to soil only (not sediment). Therefore, the risk based cleanup goal calculated for occupational worker exposure to contaminated sediments applies to the deep-water sediments in Area 3 (Figure 2-3, App-5). The residential exposure pathway to deep-water sediments is incomplete and the occupational worker exposure scenario has a low probability of occurrence (HLA 2001, TtNUS 2001). The PRGs for dioxins in Site 8 soil and sediment are summarized in Table 2-3.

Table 2-3
PRGs for TCDD and Dioxin Compounds at Site 8

Area	Unit	PRG	PRG Source
On-base Site 8 surface soil, ash, and sediment	ppt	38	MDEQ Tier 1 TRG (restricted)
On-base non-Site 8 surface soil and sediment	ppt	38	MDEQ Tier 1 TRG (restricted)
Off-base soil (Area 2)	ppt	38	MDEQ Tier 1 TRG (unrestricted)
Off-base sediment, shallow water (Area 1)	ppt	38	MDEQ Tier 1 TRG (restricted)
Off-base sediment, deep water (Area 3)	ppt	1,000	Human health risk based value excavation worker (HLA 2001)

HLA Harding Lawson Associates
MDEQ Mississippi Department of Environmental Quality
ppt parts per trillion
PRG preliminary remediation goal
TCDD 2,3,7,8-tetrachlorodibenzo-p-dioxin
TRG target risk goal

2.9 DESCRIPTION OF ALTERNATIVES

The following remedial alternatives were developed for Site 8:

- **Alternative 1: No Action.** No action would be taken. This alternative was retained as a baseline for comparison with other alternatives.

- **Alternative 2: Institutional Controls and Monitoring.** Institutional controls would consist of restricting site access and controlling site development through development and implementation of land use controls and LTM for groundwater, soil, and sediments. Monitoring would consist of periodic collection and analysis of soil, sediment, and groundwater samples to assess possible natural attenuation and detect potential contaminant migration.

- **Alternative 3: Excavation, Surface Water Controls, Dewatering, Chemical Stabilization, On-Base Landfilling, Capping, Institutional Controls, and Monitoring.** Soil ash, soil, and sediment would be excavated from Area A, on-base surface drainage ditches, and off-base swampland. Erosion, sediment, and stormwater control devices (e.g., sheet piling and silt fences) would be used to prevent erosion of contaminated soils and sediments and utilizing pumping methods to divert surface water from areas of sediment excavation. Wet sediment would be dewatered through static stockpiling. The mixture of soil ash, soil, and dewatered sediment would be spread in lifts over Area A. Each lift would be chemically stabilized with cement. The stabilized material would then be capped with a cover system designed in accordance with MDEQ regulations and AASHTO H20 specifications, or equivalent alternative specifications for concrete. The post removal site control (PRSC) component of Alternative 3 would be identical to that for Alternative 2. Monitoring would consist of regularly collecting groundwater samples from monitoring wells located down gradient from the landfill to detect any potential migration of dioxin, as well as collection of soil and sediment samples to detect soil and/or sediment migration that would indicate the ineffectiveness of the alternative.

- **Alternative 4: Excavation, Surface Water Controls, Dewatering, and Off-Base Incineration.** The excavation, surface water controls, and dewatering of Alternative 4 would be identical to those for Alternative 3. The soil ash, soil, and dewatered sediment would then be transported to a permitted off-base treatment storage and disposal facility for high-temperature incineration and disposal of incineration residues.

2.10 DETAILED ANALYSIS OF ALTERNATIVES

The remedial alternatives were analyzed in detail using seven of the nine criteria provided in the NCP and CERCLA. The final two criteria, State and Community Acceptance, were evaluated as part of the regulatory and public comment period held from April 4 through June 7, 2002. These nine criteria are as follows:

- Overall protection of human health and the environment.

- Compliance with ARARs.

- Long-term effectiveness and permanence.

- Reduction of contaminant toxicity, mobility, or volume through treatment.
- Short-term effectiveness.
- Implementability.
- Cost.
- State acceptance.
- Community acceptance.

2.10.1 Overall Protection of Human Health and the Environment

Alternative 1 would not provide protection of human health and the environment because dioxin would remain in soil, soil ash, and sediment in excess of PRGs and could result in unacceptable risk to human and ecological receptors. This alternative would not provide any warning of the potential for migration of dioxin to continue in sediment and surface water, because no monitoring would occur.

Although Alternative 2 would allow dioxin to remain in soil, soil ash, and sediment, and would possibly allow continued migration from contaminated areas, it would provide some protection by restricting access to contaminated media and warning of potential contaminant migration.

Alternative 3 would be more protective than Alternative 2 because it would essentially eliminate the potential for dioxin exposure by removing contaminated soil, soil ash, and sediment, as well as stabilizing and containing these media within an on-base landfill. Alternative 3 would also provide a warning in the unlikely event of migration of dioxin from the landfilled material to groundwater and would prevent any future site development that would compromise the structural integrity of the landfill.

Alternative 4 would provide the highest level of protection because it would not only remove contaminated soil, soil ash, and sediment from their present locations, but also would also destroy the dioxin content through high-temperature incineration.

2.10.2 Compliance with ARARs and TBCs

Alternative 1 would not comply with chemical- and location-specific ARARs. Action-specific ARARs or TBCs would not apply.

Alternatives 2 and 3 would not comply with chemical-specific ARARs and TBCs due to the pervasiveness of dioxin through the environment. Alternatives 2 and 3 would comply with location- and action-specific ARARs and TBCs.

Alternative 4 would comply with chemical-, location-, and action-specific ARARs and TBCs.

2.10.3 Long-Term Effectiveness and Permanence

Alternative 1 would have very limited long-term effectiveness and would not be permanent because no contaminant removal or reduction would occur through treatment. There would not be any institutional controls to restrict access to areas of contaminated soil, soil ash, and sediment; therefore, the potential would also exist for unacceptable risk to develop due to exposure to dioxin. Since there would be no monitoring, potential dioxin migration would remain undetected.

Alternative 2 would provide limited long-term effectiveness because it would reduce risk from exposure to contaminated soil, soil ash, and sediment, and would warn of potential dioxin migration. This alternative would not be permanent.

Alternative 3 would have more long-term effectiveness than Alternative 2 because it would remove contaminated soil, soil ash, and sediment from their present locations and effectively stabilize them and contain them within a landfill, thereby minimizing the risk of exposure to dioxin. Alternative 3 would also effectively warn of possible dioxin migration and preserve the structural integrity of the landfill cap. It would not be permanent, because not all contamination would be destroyed.

Alternative 4 would be the most long-term effective solution. This alternative would remove the contaminated soil, soil ash, and sediment from their present locations and, although high-temperature incineration might not achieve the required 99.9999% destruction and removal efficiency, it would nonetheless effectively and permanently destroy most of their dioxin content.

2.10.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Alternatives 1 and 2 would not achieve any reduction of toxicity, mobility, or volume of dioxin-contaminated media through treatment. Both alternatives might eventually achieve reduction of contaminant toxicity and volume through natural attenuation, however, under Alternative 1, this reduction would neither be verified nor quantified. No treatment residual would be associated with Alternative 2.

Alternative 3 would not achieve any reduction of toxicity or volume of dioxin-contaminated media through treatment. However, Alternative 3 would significantly reduce dioxin mobility through chemical stabilization and containment in a landfill. A wastewater residual might be generated by the sediment dewatering step, but, if appropriate, this wastewater could be discharged to surface water without treatment.

Alternative 4 would achieve a significant reduction of toxicity, mobility, and volume of dioxin-contaminated media through removal and treatment. Contaminated material would be permanently removed from the site and the dioxin content of this material would be irreversibly destroyed through high-temperature incineration. Alternative 4 might generate the same wastewater residual from the sediment dewatering operations as

Alternative 3. In addition, as a result of incineration of dioxin-contaminated media, Alternative 4 would also generate an ash residual and possibly a liquid waste residual from off-gas treatment. All residual incineration waste would require proper handling and disposal.

2.10.5 Short-Term Effectiveness

Implementation of Alternative 1 would not result in risks to site workers or adversely affect the surrounding community or environment because no exposure would occur through remedial activities. Alternative 1 would not achieve the RAOs and although the dioxin PRGs might eventually be attained through natural attenuation processes, this would not be verified.

Implementation of Alternative 2 would result in a slight possibility of exposing site workers to dioxin contamination during long-term monitoring activities. However, this risk of exposure would be effectively controlled through compliance with proper site-specific health and safety procedures. Implementation of Alternative 2 would not adversely affect the surrounding community or environment. Alternative 2 would achieve the RAOs immediately upon implementation of institutional controls and monitoring. The dioxin PRGs might be attained through natural attenuation, but the required timeframe cannot be accurately estimated.

Implementation of Alternatives 3 and 4 would result in the possibility of exposing construction workers to dioxin contamination during remedial activities. However, the risk of exposure would be effectively controlled by the implementation of engineering controls (e.g., dust suppression) and compliance with applicable Occupational Safety and Health Administration regulations and proper site-specific health and safety procedures. Implementation of Alternatives 3 and 4 would potentially affect the surrounding community because dioxin-contaminated material would be transported over public roads. In addition, off-gas emissions from the incineration facility could affect the surrounding community. However, the potential for adverse impact would be effectively addressed through i mplementation of such appropriate measures as decontamination of transport vehicles, traffic control, spill prevention and emergency response, and treatment of incineration emissions.

Alternatives 3 and 4 would achieve RAOs immediately upon removal of the contaminated soil, soil ash, and sediment. Alternative 3 might attain dioxin PRGs through natural attenuation, but the required timeframe cannot be accurately estimated. Alternative 4 would attain dioxin PRGs upon completion of the excavation operations that are anticipated to require less than one year.

2.10.6 Implementability

Implementation of Alternative 1 would involve no action.

The technical implementability of Alternative 2 would be simple, requiring only implementation of institutional controls and monitoring.

The technical implementability of Alternative 3 would be more difficult than the implementation of Alternative 2. In addition to institutional controls and monitoring, Alternative 3 would require excavation of contaminated soil, soil ash, and sediment with surface water controls, dewatering of sediment, chemical stabilization and on-base landfilling of the excavated materials, and capping of the stabilized materials. The effectiveness of these activities would be verified prior to implementation through pilot-scale testing and these activities would be technically implementable. Resources, equipment, and materials are readily available to perform the tasks associated with Alternative 3.

Alternative 4 would be somewhat harder to implement than Alternative 3 although Alternative 4 would require fewer sequential operational steps. Resources, equipment, and materials are readily available to perform excavation, dewatering, and transportation activities but the number of off-base incineration facilities that might accept the dioxin-contaminated material for treatment would likely be extremely limited and securing acceptance of the excavated material might be quite difficult.

Administratively, Alternatives 2 and 3 would require the development and implementation of PRSCs and the performance of long-term monitoring and 5-year site reviews. Alternative 3 would require authorizations for the excavation of the off-base sediment, permitting prior to remediation of the off-base wetlands, and a permit for the construction of the on-base landfill. Alternative 4 would not require PRSCs or long-term monitoring or 5-year reviews, but would require authorization for the excavation of the off-base sediment, possible permitting prior to remediation of the off-base wetlands, manifesting of the material to be transported off-base, and formal acceptance of this material by the off-base incineration facility. These administrative requirements could all be satisfied.

2.10.7 Cost

Preliminary capital and O&M costs and net present worth (NPW) of the remedial alternatives have been estimated to the nearest $1,000:

Alternative	Capital ($)	30-year NPW of O&M ($)	30-year NPW ($)
1	0	0	0
2	32,000	277,000	309,000
3	10,714,000	277,000	10,991,000
4	61,516,000	0	61,516,000

2.10.8 State Acceptance

The MDEQ concurred with the PP identifying Alternative 3 as the preferred alternative for the remediation of HO contamination at Site 8 and Associated Areas during the meeting held with the USN and USAF on February 14, 2002 in Jackson, MS.

2.10.9 Community Acceptance

The PP identifying Alternative 3 as the preferred alternative was presented to the public at the public meeting held on April 4, 2002. Public comments were accepted at the public meeting and during the public comment period that ran from April 4 to June 7, 2002. Public comments were addressed in the Responsiveness Summary included as an attachment to this DD. The Responsiveness Summary was mailed to the commenters and placed in the Administrative Record. The public accepted the PP based on the comments received during the public meeting and during the public comment period.

2.11 COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives were compared to each other using the same criteria that were used for detailed analysis. The following is a summary of these comparisons (Table 2-4).

2.12 PRINCIPAL THREAT WASTE

The NCP establishes an expectation that USEPA will use treatment to address the principal threats posed by a site wherever practicable: 40 CFR 300.430(a)(1)(iii)(A). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is defined as material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered a source material; however, non-aqueous phase liquid in groundwater may be viewed as source material. Principal threat wastes are those source materials considered highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. Remedies that involve treatment of principal threat wastes likely will satisfy the statutory preference for treatment as a principal element, although this will not necessarily be true in all cases.

Table 2-4
Summary of Comparative Evaluation of Soil and Sediment Remedial Alternatives

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls and Monitoring	Alternative 3 Excavation, Surface Water Controls, Dewatering, Chemical Stabilization and On-base Landfilling, Capping, Institutional Controls, and Monitoring	Alternative 4 Excavation, Surface Water Controls, Dewatering, and Off-base Incineration
Overall Protection of Human Health and Environment	Would not be protective because there would be a continued risk from exposure to contaminated soil ash and sediment. In addition, potential contaminant migration would remain unchecked.	Would be protective by reducing risk from exposure to dioxin by restricting access to contaminated areas and controlling future land use.	Would be more protective than Alternative 2 by further reducing risk from exposure to dioxin through removal of contaminated soil ash and sediment from their present locations and containment of these materials in a secure on-base landfill.	Would be more protective than Alternative 3 by essentially eliminating risk from exposure to dioxin through removal of contaminated soil ash and sediment from their present locations and destruction of their dioxin content with off-base incineration.
Compliance with ARARs and TBCs:				
Chemical-Specific	Would not comply	Might eventually comply	Might eventually comply	Would not comply
Location-Specific	Would not comply	Would not comply	Would not comply	Would not comply
Action-Specific	Not applicable	Would not comply	Would not comply	Would not comply
Long-Term Effectiveness and Permanence	Would not be long-term effective and permanent since contaminants would remain on-site. Any long-term effectiveness would not be known since monitoring would not occur.	Would be long-term effective and permanent. Site access and land use restrictions would effectively prevent unacceptable risk from exposure to dioxin. Monitoring would warn of potential dioxin migration.	Would be more long-term effective and permanent than Alternative 2 since it would remove contaminated soil ash and sediment from their present location and effectively contain these materials in a secure on-base landfill.	Would be more long-term effective and permanent as Alternative 3 since it would not only remove contaminated soil and sediment from their present location but also effectively destroy their dioxin content instead of merely containing it.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not achieve reduction of toxicity, mobility, or volume of dioxin through treatment. Might achieve some reduction of toxicity and volume through natural attenuation.	Would not achieve reduction of toxicity, mobility, or volume of contaminants through treatment. Might achieve some reduction of toxicity and volume through natural attenuation.	Would achieve reduction of contaminant mobility through treatment. Some reduction of toxicity and volume might also be achieved through natural attenuation.	Would achieve reduction of contaminant toxicity, mobility, and volume through treatment. Approximately 71,000 yd3 of contaminated material would be permanently removed and its dioxin content would be irreversibly destroyed by incineration.
Short-Term Effectiveness	Would not result in short-term risks to site workers or adversely impact the surrounding community but would also not achieve RAOs or meet the dioxin PRGs.	Would result in slight risk of exposure to site workers during monitoring. This risk would be adequately controlled through compliance with site-specific health and safety procedures, including wearing of appropriate PPE. RAOs would be achieved immediately upon implementation. Dioxin PRGs might be attained through natural attenuation but the required timeframe cannot yet be estimated.	Would result in significant risk of exposure to workers and slight risk of impact to surrounding community during remedial activities. These risks would be adequately controlled implementation of engineering controls (dust suppression, spill prevention) and compliance with site-specific health and safety procedures. RAOs would be achieved immediately upon implementation. Dioxin PRGs might be attained through natural attenuation but the required timeframe cannot be estimated at this time.	Would result in significant risk of exposure to workers and slight risk of impact to surrounding community during remedial activities. These risks would be adequately controlled implementation of engineering controls (dust suppression, spill prevention) and compliance with site-specific health and safety procedures. RAOs would be achieved immediately upon Implementation. Dioxin PRGs would be attained within 3 months.
Implementability	Would be simplest to implement since nothing would be implemented.	Would be technically simple to implement. Necessary resources, equipment, and materials are readily available. Administratively, would require a PRSC and 5-year reviews but no construction permit.	Would be more difficult to implement than Alternative 2 since it would require significant construction activities in addition to institutional controls and monitoring. However, all components would be technically feasible and the necessary resources, equipment, and materials are readily available. Administratively would require authorization for access to off-base swampland, a construction permit, a PRSC, and 5-year reviews, all of which could be done.	Would be slightly less difficult to implement than alternative 3 since on-site activities would be limited to excavation and dewatering and there would be no institutional controls or monitoring. All components would be technically feasible and the necessary resources, equipment, and materials are readily available. Administratively would require authorization for access to off-base swampland, a construction permit, waste transportation manifesting, and formal acceptance from the off-base incineration facility, all of which could be obtained.
Costs:				
Capital	$0	$32,000	$10,714,000	$61,516,000
30-Year NPW of O&M	$0	$277,000	$277,000	$0
30-Year NPW	$0	$309,000	$10,991,000	$61,516,000

ARAR Applicable or Relevant and Appropriate Requirement
NPW net present worth
O&M operation and maintenance
PPE personal protective equipment
PRG preliminary remediation goal
PRSC post removal site control
RAO remedial action objective
TBC to be considered

The dioxin-contaminated soils at Site 8 and ditch sediments at the Outfall 3 area can be considered "principal threat wastes" because the chemicals of concern are found at concentrations that could pose a significant human health risk. The excess carcinogenic risks to the on-base resident, occupational worker, and site worker exceeds six in one hundred thousand (6×10^{-5}). Although dioxins detected in surface water and groundwater also pose a risk, surface water and groundwater are not considered "principal threats" as defined by 40 CFR 300.430(a)(1)(iii)(A). Previous investigations (the Feasibility Study and FFS) have demonstrated that shallow soil dioxin contamination has not migrated beyond two feet below the ground surface at Site 8. No evidence exists that dioxin contamination has migrated below the bed load sediments in the drainage systems.

2.13 SELECTED REMEDY

Alternative 3 consists of seven major technology components: (1) excavation of contaminated soil ash, soil, and sediments, (2) surface water controls, (3) dewatering of excavated sediments, (4) chemical stabilization and on-base landfilling of all excavated media, (5) capping of stabilized media mix, (6) institutional controls, and (7) monitoring.

Alternative 3 was selected because it is expected to achieve substantial and long-term risk reduction through removal of contaminated media. It is more effective than Alternative 2 because it incorporates treatment of contaminated soil, soil ash, and excavated sediments, chemical stabilization of the media, consolidation of the media in a secured on-base landfill, as well as the implementation of institutional controls and monitoring. The concentrations of residual dioxins on site (except underneath the capped landfill) after excavation activities are expected to be at levels that do not pose unacceptable risks to human health and the environment. Reduction of toxicity and volume of contaminants in the landfilled media might occur through natural attenuation, however, the remedial timeframe cannot be accurately determined. Implementation of Alternative 4 would result in the destruction of dioxins in contaminated media by incineration, but it would pose a higher short-term risk to the community during the transport of contaminated media to a disposal site; and, the $61 million estimated cost of incineration is prohibitively high.

Control of long-term risk would be provided by the landfill cap that would be designed according to H20 specifications (or constructed of concrete) as well as the institutional controls that would allow productive use of the site and protect site workers and other potential receptors. Monitoring would provide a means to verify that chemical stabilization has prevented dioxins from contaminating the groundwater that migrates into the drainage system.

Based on the information available at this time, the USAF and USN believe Alternative 3 would be protective of human health and the environment, would comply with ARARs and TBCs, would be cost-effective, and would utilize alternative treatment technologies to the maximum extent practicable. Because it would contain the source materials constituting principal threat wastes, the remedy would satisfy the statutory preference for the selection of a remedy that involves treatment as a principal element.

2.14 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative containment technologies to the maximum extent practicable.

This remedy satisfies the statutory preference for treatment via stabilization and containment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

2.15 DOCUMENTATION OF SIGNIFICANT CHANGES

Alternative 3 is the selected remedy for Site 8 and is described in Section 2.13 of this DD. The option to use rolled, compacted concrete to construct the landfill cap has been added, however, this is not considered a significant change to the preferred alternative. No significant changes have been made to the preferred alternative (Alternative 3) that was presented in the revised final PP (March 2002) and subjected to public comment between April 4, 2002 and June 7, 2002.

3. RESPONSIVENESS SUMMARY

This section documents the responses to significant comments, criticisms, and new data submitted in oral or written form during the comment period (April 4, 2002 to June 7, 2002) for the proposed remedial alternative. SARA §113 and §117 and NCP §300.430(f)(3)(i)(F) require that NCBC prepare and document these responses including those pertaining to the contents of the Administrative Record file for the remediation of dioxin contamination at Site 8 and Associated Areas.

3.1 OVERVIEW

At the time of the public comment period, the USN and USAF were recommending Alternative 3 as the preferred alternative for the dioxin contamination at Site 8 and Associated Areas. The preferred alternative addressed dioxin contamination in the soil, soil ash, and sediments. The preferred alternative, specified in the Proposed Plan, involved excavation and hauling of dioxin-contaminated media to Site 8, mixing the different media and stabilizing the mixture with cement, covering the stabilized mix with an engineered cap according to State highways compaction specification, and implementing land use controls and a Long Term Management program.

Judging from the comments received during the public comment period, the residents of Gulfport, MS and the MDEQ would support Alternative 3. Some community members expressed concern that the area outside of NCBC Gulfport may not have been fully characterized and requested additional and expanded testing for dioxins, taking into consideration the configuration of the ditch system between 1968 and 1978, potential transport of dioxin-contaminated sediment during flooding, and other concerns listed in Section 3.3.1. In addition, the community also expressed concerns regarding cancer incidents and other unusual maladies suffered by those who lived within the vicinity of the ditch areas.

These sections follow:

- Background on community involvement.
- Summary of comments received during the public comment period and NCBC responses.
- Community relations activities.
- Remaining concerns.

3.2 BACKGROUND ON COMMUNITY INVOLVEMENT

Community involvement activities began in the late 1980's prior to the USAF incineration of dioxin-contaminated soils on base. A formal public meeting and public comment period were held prior to the incineration. There were no community members in attendance at the meeting and no comments were received during the Public Comment Period.

In the early 1990's, low concentrations of dioxin were found in sediments leaving the base. These findings were possible because more sensitive dioxin tests had been developed in the interim. Also, MDEQ had lowered their action level of dioxin to 4.3 ppt. They had previously used USEPA's action level of 1.0 ppb. These new findings prompted a host of community outreach activities that are described in Section 3.4.

The first community meeting was held immediately after dioxin was found off-base in early 1995. The meeting was well attended by community members, representatives of the Environmental Justice movement, and community leaders. Subsequently, a community advisory board, called the NCBC Restoration Advisory Board (RAB) was formed to encourage continuous dialogue between NCBC Gulfport and the affected community. Community members were invited to attend the RAB meetings; however, attendance of community members other than RAB members was minimal prior to 2002.

In addition to the RAB meetings, nine public availability sessions/public meetings were held. These meetings were lightly attended, with the exception of the two meetings held to present results of off-base sampling. Concern again waned when community members observed that dioxin-contamination was concentrated in undeveloped areas north of NCBC Gulfport.

The Public Comment Period for the Feasibility Study and Proposed Plan opened on April 4, 2002 with a public meeting. Despite large-scale efforts to inform the community of the meeting and comment period, attendance at the meeting was limited to members of the RAB. However, during the first 30 days of the comment period, a citizen became concerned about health risks in her neighborhood. She shared her concern with a number of other community members and a request for extension of the Public Comment Period was filed. Most of the public comments recorded here were received after the close of the original public comment period.

Public concern has remained high since the close of the Public Comment Period on June 7, 2002. In particular, community members remain highly concerned about health effects that they believe may be related to dioxin contamination.

3.3 PUBLIC COMMENTS

The Public Comment Period for the Proposed Plan was held from April 4 to June 7, 2001. Comments received during this time are summarized below. Comments are categorized by relevant topics.

3.3.1 Remedial Investigation Concerns

(1) Residents requested additional sampling north and south of NCBC Gulfport to ensure that all of the dioxin related to the storage of Herbicide Orange on NCBC Gulfport had been found. Many of these requests were based on health concerns. (Please see Section 3.3.2). Specific comments included:

- A number of residents were concerned that their properties, located north of NCBC Gulfport and Site 8, may be dioxin-contaminated. Many of these properties are located along drainage ditches that run from NCBC Gulfport. Some of these properties are not located along the ditches, but are situated to receive floodwater from the north side of NCBC Gulfport.

- A Long Beach resident wanted NCBC Gulfport to consider sampling in the canal that runs beside her home and through the middle of USM Gulf Park and Saint Thomas Church and school. Another Long Beach resident asked that her mother's property be tested for dioxin.

- A resident asked that two areas south and southwest of NCBC Gulfport be sampled: 1) an area that runs along a stream adjacent to the Lynwood subdivision in Long Beach off of Pineville Road and Alexander Road; and 2) an area that runs along a stream that runs southwest of NCBC Gulfport and adjacent to the subdivision and a fill dirt lake.

- A resident requested that the entire area be retested to see how dioxin has migrated or is likely to migrate downstream from the site.

- A resident requested that her tap be sampled for dioxin.

NCBC Gulfport Response

In response to community concerns, as of November 2004, 61 additional soil and three water samples have been taken in the neighborhoods surrounding NCBC Gulfport. These sampling events followed extensive sampling on and off of NCBC Gulfport during the Remedial Investigation (RI) phase of the cleanup process. During the RI, over 100 samples were collected in known drainage pathways in areas outside of NCBC Gulfport. Samples collected during the Remedial Investigation were selected in areas where dioxin would be expected to accumulate (i.e., areas of slow moving water containing rich organic sediment).

Samples collected in response to public comments were selected to look at areas and concerns not previously addressed in the RI. The locations and rationale of additional samples are summarized below.

- *North of NCBC Gulfport and 28th Street:* Nine samples were collected to determine if contaminated samples had been transported across 28th Street during large storm events and deposited in the low areas located north of Site 8.

- *North of Turkey Creek and Canal Road:* Two sediment samples were collected in this area because it is prone to flooding from Turkey Creek. One sample was collected along South Boulevard to assess the comment that it may have been built up with contaminated soil from NCBC Gulfport. A second sample was collected on a private lot where the landowner complained of high mortality of his goats. Three tap water samples were collected in this area.

- *Bear Creek Drainage Basin*: Three samples were collected here to determine if potentially contaminated sediments were migrating off-base via this natural waterway.

- *Cleveland Avenue/Canal 1 Basin*: One sample was collected in a man-made ditch.

- *Gaston Ponte/Brickyard Bayou Basin*: One sample was collected in a man-made ditch.

- *Papania Lane Dirt Pile:* One sample was collected from a pile of dirt that appeared to have been dredged from a drainage ditch.

- *Canal Road Dirt Pile:* Two samples were collected from a long pile of dirt along the west side of Canal Road believed to have been dredged from the canal that runs between the piles and the road. An additional 30 samples were collected in this area after low levels of dioxin were found (see discussion below).

- *East/Northeast Fence Line:* Two dioxin samples were collected in response to the report that Herbicide Orange had been used to spray NCBC Gulfport fence line and 10 Polychlorinated Biphenyl (PCB) samples were collected to test for residual contamination from the former transformer storage area on base.

The two samples collected in the Canal Road dirt pile each contained low levels of dioxin. In response, the soil piles have been sampled and analysis is being performed. Results will be published in early 2005.

With the exception of the Canal Road dirt pile, samples collected in response to concerns raised during the Public Comment Period showed no new evidence of dioxin contamination related to Herbicide Orange in the sediments or the tap water. Also, there was no evidence to support the allegation that South Boulevard was built up with dioxin-contaminated soil. Further, a sample collected on a private lot did not support a link between dioxin contamination and goat mortality.

Results of one sample collected north of NCBC Gulfport suggested the possible presence of transformer fluid components. In response, a record search was completed that led to a former transformer storage location on base. The former transformer storage location was then investigated by collecting 10 Polychlorinated Biphenyl (PCB) and two dioxin samples. These samples, collected along the NCBC Gulfport fence line, showed no indication of PCB or dioxin contamination in the area of concern.

(2) A resident reported that during any hard rain the ditches would back up and the streets would flood. The water would stand about a foot deep in the streets, sometimes deeper.

NCBC Gulfport Response

Information about flooding was used to determine the best sampling locations for the supplemental sampling completed in the 2002 Off-Base Community Sampling event.

(3) Four comments were received concerning off-base landfills.

- A resident reported that dirt from the on-base ditches was placed in the Canal Road landfill in the 1970's and 80's.

- A second resident reported that the Navy dug out the ditches that drained into the canal following the period when the fish died out in the creek in the early 70's and that the sediment was placed in the dump on Canal Road.

- A resident reported that her relatives observed NCBC Gulfport personnel dumping barrels of Herbicide Orange at the landfill on Canal Road.

- A resident requested that a landfill located west of 34th Avenue and north of Martin Luther King Jr. Boulevard that was used by the military, be tested for dioxin

NCBC Gulfport Response

The Navy was not able to confirm this information. Additionally, in response to these comments, NCBC Gulfport staff contacted the former Open Storage Supervisor (1968 – 1982). The former supervisor stated that no drums left NCBC Gulfport for placement in local landfills, therefore there is no evidence to indicate the need to sample the landfills at this time.

(4) Four residents, including a representative of the local Sierra Club, expressed concern about reports that Herbicide Orange had been sprayed for weed control, particularly along the NCBC Gulfport perimeter fence.

NCBC Gulfport Response

A representative of NCBC Gulfport followed up on this account by finding a former employee of the fence company who installed the perimeter fence. The former employee confirmed that the fence line had been sprayed with Herbicide Orange. In response, two dioxin samples were collected along the fence line. No dioxin was found in the samples. No other specific areas were identified for dioxin testing.

(5) A resident requested that a study be conducted on the ditch system as it was from 1968 to 1978, during the time of leakage and hurricanes that could have spread sediment that was contaminated.

NCBC Gulfport Response

Samples collected after the Public Comment Period and described in response to comment (1) above were selected with consideration of prior drainage pathways. In addition, samples were collected from dirt piles believed to have been dredged in the past from drainage pathways in an effort to gain a better understanding of historical conditions in the area.

(6) A resident requested that historical maps be reviewed to trace older drainage pathways and to consider these older pathways when selecting sample locations

NCBC Gulfport Response

Aerial photographs, historical maps, and information from local residents were used to establish the sediment locations described above.

(7) A resident requested full suite soil samples in her neighborhood.

NCBC Gulfport Response

Full suite analyses were run on five percent of all samples during the Remedial Investigation as part of the process of determining chemicals and media of concern. Further, in response to this comment, one of the three tap water samples described above was collected in the home of this concerned citizen. Full suite (i.e., EPA's Target Analyte List) plus dioxin analyses were run on all

three of the tap water samples collected because these analyses address the constituents in the Safe Drinking Water Standards.

(8) A resident expressed concern that many young adults from his neighborhood are having health problems. These residents played together as teenagers on a dirt bike trail that was adjacent to the canal in the area of 46th Avenue. He requested that this area be tested for contamination.

NCBC Gulfport Response

Sampling in this area had been completed during the Remedial Investigation phase of the project, prior to the Public Comment Period. Elevated levels of dioxin were not found in the area of concern identified by the commenter.

(9) Two residents expressed concern about Site 4. One resident requested expediting the Site 4 Remedial Investigation because:

- Dioxin was found at this site;
- She had heard that damaged Herbicide Orange barrels were placed in this former landfill;
- She had heard that the Site 4 landfill received waste from Hurricane Camille; and
- The landfill did seep [and it is located along Canal 1 which flows] into Turkey Creek.

Another resident summarized what he believed to be true about the history of dioxin at NCBC Gulfport and expressed concern that the study of Site 4 (the golf course) had not been completed because of funding issues.

NCBC Gulfport Response

Site 4 is a landfill that received waste during the Hurricane Camille cleanup and is currently under a remedial investigation by the Navy. Dioxin seepage at low levels was identified at this site in an earlier investigation. In 1997, the Navy installed carbon filter beds in the landfill along the drainage canal to intercept any dioxin that might have an opportunity to move into the drainage system. This carbon filtration system remains in place today.

(10) Two comments were received concerning reports of buried drums on the Site 4 golf course.

- A resident told a commenter that his father helped bury drums of Herbicide Orange in the former landfill (Site 4) on NCBC Gulfport in an area that is now a golf course. That landfill runs alongside Canal 1 that eventually flows into Turkey Creek.
- Another resident reported that the damaged barrels of Herbicide Orange were placed in the golf course landfill on base.

NCBC Gulfport Response

The Navy has taken several steps to find buried drums in and near the golf course landfill. Over 50 samples have been collected beneath the surface of on and near the golf course using a technique

(direct push technology) that allows for the collection of both soil and water samples. These samples were analyzed for the presence of dioxin related to Herbicide Orange. In addition, geophysical surveys have been conducted to look for buried drums and other metal objects. No indication of the presence of drums, metal objects, Herbicide Orange, or dioxins related to Herbicide Orange was found.

3.3.2 Human Health Concerns

(1) Several residents expressed concern about health issues that they believed could be the result of exposure to dioxin and/or Agent Orange. Concerns range from skin problems, birth defects, neurological disorders such as Corticobasal Ganglionic Degeneration (CBGD), various cancers, perceived cancer clusters, liver problems, diabetes, heart disease, high blood pressure and strokes, severe headaches and nausea, and other diseases, disorders, and health concerns.

- One resident stated that her father, who died of cancer, often came home with "the chemical" on his clothes when he worked at NCBC Gulfport.
- A 30-year-old resident with skin and other health problems has lived in the same house on 54th street for his entire life. He played in the ditches as a child.
- A resident noted that many young adults (now in their 30's) from his neighborhood are having health problems including cancers, liver problems, and nerve disorders. The common denominator is that these young adults played together as teenagers on a dirt bike trail that was adjacent to the canal in the area of 46th Avenue.

In the late sixties and early seventies the kids in Gulfport Heights swam in the floodwater that came off base and filled their ditches.

NCBC Gulfport Response

The Agency for Toxic Substances and Disease Registry (ATSDR) is the federal agency responsible for the types of health studies needed to assess community public health concerns. ATSDR was contacted by a resident and a Public Health Assessment for NCBC Gulfport is nearing completion.

(2) A resident requested that the [health] effects of Herbicide Orange be studied and that everyone north and south of NCBC Gulfport be notified of the "problems."

NCBC Gulfport Response

The ATSDR is currently in the process of preparing a Public Health Assessment to address these concerns. A draft public health assessment document was made available to the public during a public comment period. Issues raised during the public comment period are currently being addressed.

3.3.3 Concerns About Risk Management

(1) A resident expressed concern that the Navy knew of contamination in the neighborhood for 34 years and did not take action sooner.

NCBC Gulfport Response

Dioxin concentrations have never been found in the community at levels that would require reporting or remedial action. The Navy first became aware of low levels of off-base contamination at levels that exceeded Mississippi action levels in 1995, during a routine base wide sampling event. Prior to this date, Air Force studies had identified low concentrations of dioxin in some of the ditches closest to NCBC Gulfport. However, these levels were considered to be safe at the time. Later studies showed that dioxin has the potential to cause health effects at much lower concentrations. In response, MDEQ lowered their screening levels for dioxin. In 1995 NCBC Gulfport conducted the routine base-wide sampling effort mentioned above as part of their Installation Restoration Program. Dioxin was found at that time and the current extensive dioxin study and cleanup was initiated.

(2) A resident asked why the EPA did not issue a warning about the off-base dioxin.

NCBC Gulfport Response

The dioxin levels associated with Herbicide Orange are not high enough to trigger a response from the EPA. The EPA becomes concerned with dioxin levels that are 1 part per billion (ppb) or higher. All samples collected in the neighborhoods surrounding NCBC Gulfport contained dioxin concentrations significantly below 1 ppb.

(3) A resident wanted an explanation of why NCBC Gulfport was not placed on the National Priorities List. The Hazard Ranking System (HRS) score for NCBC Gulfport was 62.33 and at one time the cut off for placing a site on the NPL was 28.5.

NCBC Gulfport Response

The HRS is the screening tool used by the Environmental Protection Agency (EPA) to evaluate risks to public health and the environment associated with a site. Using the HRS, EPA assigns a score between 0 and 100 to indicate the relative seriousness of the risks posed by the site. If a site does not qualify for the NPL, it may be addressed by other means including Superfund response programs, such as removal and emergency response, via other environmental laws (e.g., Resource Conservation and Recovery Act or the Clean Water Act). Sites may also be referred to other federal programs, such as the Brownfields Economic Redevelopment Initiative, or may be handled by state hazardous substance response programs, including voluntary cleanup.

When the Navy submitted a draft HRS scoring package score (62.33) for NCBC Gulfport, the package did not contain enough supportive data to substantiate a score of 28.5 or above. Thus, EPA did not move forward with proposing NCBC Gulfport for the NPL. It is important to note that while this site is not listed on the NPL, cleanup is currently ongoing through the Navy's Installation Restoration Program under a Mississippi Department of Environmental Quality order with input from the Environmental Protection Agency (Region 4), the National Oceanic and Atmospheric Administration and the Agency of Toxic Substances and Disease Registry. In addition, cleanup is proceeding under MDEQ environmental program guidance and consent. While EPA does not anticipate re-ranking the site at this time, the on-going remediation work at NCBC Gulfport has high visibility within the EPA structure.

(4) A resident asked what will be done if it is found that medical problems were caused by exposure to dioxin.

NCBC Gulfport Response

The Navy and Air Force are cooperating with the ATSDR, who are looking at these and all health concerns related to dioxin-contamination in the vicinity of NCBC Gulfport.

(5) A representative of the Sierra Club suggested that a moratorium on new construction should be implemented to prevent moving new people into "possibly contaminated" areas.

NCBC Gulfport Response

A civilian authority or regulatory agency would be responsible for implementing a new construction moratorium or similar action. However, off base sampling showed no dioxin levels that would warrant such action with the exception of the areas identified for cleanup in the Proposed Plan.

3.3.4 Concerns About the Cleanup Approach

(1) A representative of the Sierra Club expressed concern that the proposed remediation would consist of mixing cement with contaminated soil and placing it in the wetlands near Outfall 3. They requested information about alternatives that would be more environmentally acceptable.

NCBC Gulfport Response

The proposed remedy does not involve placing the cement and contaminated soil mix near Outfall 3. Rather, the soil/cement mixture will be placed on Site 8 and covered with a cap.

(2) A resident asked if the Navy investigated purchasing the land, fencing off the area, installing barriers to prevent further dioxin spreading and using in-situ biotreatment to clean up the area with the goal of leaving the wetlands undisturbed.

NCBC Gulfport Response

The Navy has no plan to purchase any additional land within the immediate area of NCBC. The proposed remedial action was designed to excavate all dioxin-contaminated sediments and soil from the swamp areas and haul them into a common area inside NCBC Gulfport where it will be stabilized and protected from unauthorized access by physical barriers such as fences.

In-situ biotreatment is not a preferred cleanup technology because dioxins are known to be virtually indestructible by natural degradation. If left in place, dioxins in sediments and soil could pose unacceptable hazards to ecological receptors and could further impact other species including humans due to bioaccumulation and persistence in the environment.

3.3.5 Request for Extension of the Comment Period

(1) A resident requested that the comment period be extended because she became aware of the comment period only days before it was to close.

NCBC Gulfport Response

The comment period was extended for over 30 days in response to this request.

3.3.6 Concerns About How Early Concerns Were Addressed

(1) A resident registered a complaint that his concerns were either evaded or not taken seriously earlier in the process.

NCBC Gulfport Response

Changes have been made in the communications process to correct the problems identified by the commenter.

3.3.7 Anecdotal and Eyewitness Information

(1) Residents heard or reported the following information related to defoliation in the vicinity of NCBC Gulfport:

- A resident reported that trees in the neighborhood of 46th Street were defoliated in 1970-71.
- Another resident reported that plants on their property were defoliated after Agent Orange was incinerated on base.

NCBC Gulfport Response

NCBC Gulfport staff have not been able to find documentation of the defoliation event that reportedly occurred in the early 1970's. Defoliation could occur if Herbicide Orange or any other herbicide was used on a windy day. Comments about the reported defoliation have been shared with ATSDR and the MDEQ.

Similarly, no records have been found of a defoliation event occurring in the late 1980's, either during or after the incineration of dioxin-contaminated soil. Dioxin contaminated soil (not Herbicide Orange) was incinerated on base. Herbicide Orange was transferred to an incinerator ship where it was transported to the South Pacific and burned onboard at sea.

(2) A resident expressed concern that Herbicide Orange was stored on NCBC Gulfport during Hurricane Camille and that drums may have been damaged during the high winds associated with the hurricane.

NCBC Gulfport Response

Aerial photographs, taken two to three days after Hurricane Camille, were reviewed in response to community concerns. The aerial photographs showed intact drums on the ground indicating that no

damage had occurred.

(3) One resident reported that dirt was dug out of ditches and placed in his yard. Another resident reported that dirt from the construction of the Canal Road bridge was placed in his brother's yard.

NCBC Gulfport Response

Several reports of potentially contaminated soil being placed on private property have been researched and two properties were sampled. In all cases, dioxin was not found at concentrations higher than the most restrictive state residential standards.

(4) Twelve residents reported unusual environmental conditions including:

- A resident reported that people living north of NCBC Gulfport had reported catching rats with tumors in their homes and seeing three legged frogs in their yards.
- A resident reported that their son saw 5-legged frogs and frogs with legs growing out of their necks.
- Several residents reported that most of their animals died and that all of the animals that they kept outside died at a young age. They also reported having a hard time growing plants and planting gardens and that they had a difficult time maintaining healthy lawns. They also reported that the animals they kept outside were skinny and looked "malnutritioned."
- One resident reported that vegetation "blistered" in the 1980's at the same time that deformed birds, lizards, and frogs were found in the area.

NCBC Gulfport Response

A local veterinarian was contacted to discuss reports of animals dying. While the veterinarian remembered the event, the cause could not be determined.

This and all information regarding health and ecological concerns have been forwarded to the ATSDR, MDEQ, and other appropriate state and federal government agencies.

3.4 COMMUNITY RELATIONS ACTIVITIES

A comprehensive community relations program has made every effort to maintain a two-way dialogue with the community concerning the investigation and cleanup of dioxin contamination at and near NCBC Gulfport.

3.4.1 Initial Community Relations Activities

NCBC Gulfport immediately developed a comprehensive community relations program when dioxin was found off-base. Activities included the following.

- A well-attended community forum was held when dioxin was initially found in the ditches outside of the base.

- Fact sheets have been distributed to report sample results throughout the project as they became available.

- The RAB was formed in late 1994. From 1994 through mid-1998 the RAB met monthly, and has since met quarterly. Notices of the RAB meetings are mailed to up to 800 residents who have elected to be on the RAB mailing list.

- Sediment Recovery Traps (SRTs) were installed in the ditches exiting the base to capture dioxin-contaminated sediment leaving the base. A series of three fact sheets were distributed to the community to describe the construction, locations, and effectiveness of the SRTs.

- Gulfport city officials were notified of the contaminated sediment in the ditches and NCBC Gulfport became involved in a road-improvement project along 28th Street by removing contaminated sediment in the ditches prior to road construction. A fact sheet describing the action was distributed to the community.

- In 1996, a community survey was conducted as part of a Community Relations Plan update and to gather information to support the preparation of a risk assessment. Over 800 people were interviewed for the survey. Nearly all 800 interviewees elected to be added to the mailing list.

3.4.2 Public Meetings and Public Availability Sessions

A series of nine Public Availability Sessions (PAS) and Public Meetings were held at key steps in the investigation and cleanup process. The community was notified of Public Availability Sessions and Public Meetings by mailed notices, display advertisement in the *Sun Herald*, and news releases to the local media (radio, television, and newspaper). Fact sheets and other handouts were distributed at all of the meetings. The meetings are briefly summarized below.

- January 1996: A PAS was held to present an overview of the sampling and cleanup process, including facts about dioxin, possible cleanup approaches, an introduction to the community advisory board role and membership, and possibilities for business participation in the investigation and cleanup.

- April 1997: A PAS was held as part of a concerted effort to inform the community about the off-base sampling program. In addition to holding four separate public availability sessions, the information was also shared by visiting six schools, participating in an Earth Day event, and following sampling crews with an "Information Van" to pass out information and discuss sampling with interested and/or concerned community members.

- May 1997: NCBC Gulfport joined with the MDEQ to present information about delisting ash from the incineration of dioxin-contaminated soil in the 1980's. The meetings included a PAS followed by a formal presentation by MDEQ.

- September 1997: A PAS was held to present results from the first phase of dioxin sampling.

- August 1998: A PAS was held to present results from the second and third phases of dioxin sampling.

- September 1998: A PAS was held to present results of groundwater sampling on NCBC Gulfport.

- August 2000: A PAS was held to present initial results from the human health and ecological risk assessments.
- November 2001: A PAS showcased the results of the pilot-scale engineering studies and the Feasibility Study for the cleanup of dioxin-contaminated materials.
- April 2002: A formal Public Meeting and a PAS were held to present the Proposed Plan for Site 8, Former Herbicide Orange Storage Area and Associated Areas. These meetings marked the opening of the Public Comment Period.
- October 2003: The ATSDR and NCBC Gulfport held a joint PAS to introduce the community to the Public Health Assessment process. The PAS was followed by a RAB meeting and an opportunity for community members to speak directly with ATSDR representatives.
- August 2004: The ATSDR held a Public Meeting to present the draft Public Health Assessment to the community.

3.4.3 Public Notice and Public Comment Period

The initial public comment period for the Proposed Plan for Site 8, Former Herbicide Orange Storage Area and Associated Areas was held from April 4 to May 5, 2002. The Public Meeting, Public Comment Period and the availability of the Feasibility Study and Proposed Plan were announced three times via a Public Notice in the *Sun Herald* (March 18, March 31 and April 2, 2002), by mailing of over 800 flyers, and by personal invitations to the RAB members and select community leaders. The meeting was poorly attended.

The public comment period was extended to June 7, 2002 based on a written comment received prior to the May 4, 2002 initial deadline. A public notice announcing the extended comment period was published in the *Sun Herald* newspaper on May 9, 2002.

The community has been continuously informed about actions taken in response to comments received during the Public Comment Period through poster sessions, quarterly RAB meetings, fact sheets, informal meetings and correspondence.

3.5 TECHNICAL AND LEGAL ISSUES

Two technical issues are being addressed, but are not yet resolved:

- The Public Health Assessment report is in progress. Health concerns voiced by the community are being assessed by the ATSDR in the context of this document.
- The dirt piles along the west side of Canal Road are still under investigation. If they are found to be contaminated, they may be addressed under this remedial action.

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Figure 1-1
Vicinity Map of Site 8

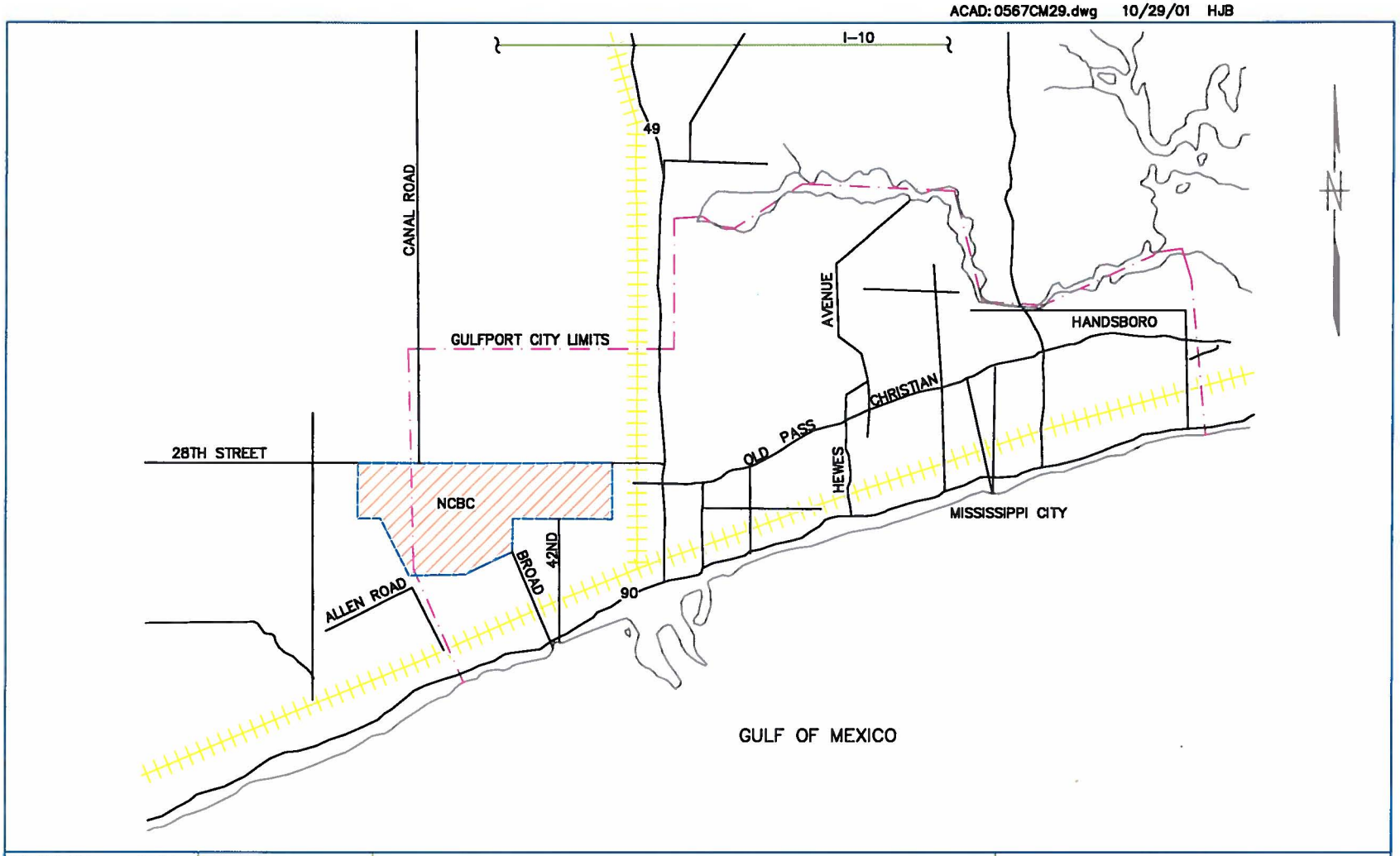

Figure 1-2
Locations of Areas A, B, and C at Site 8

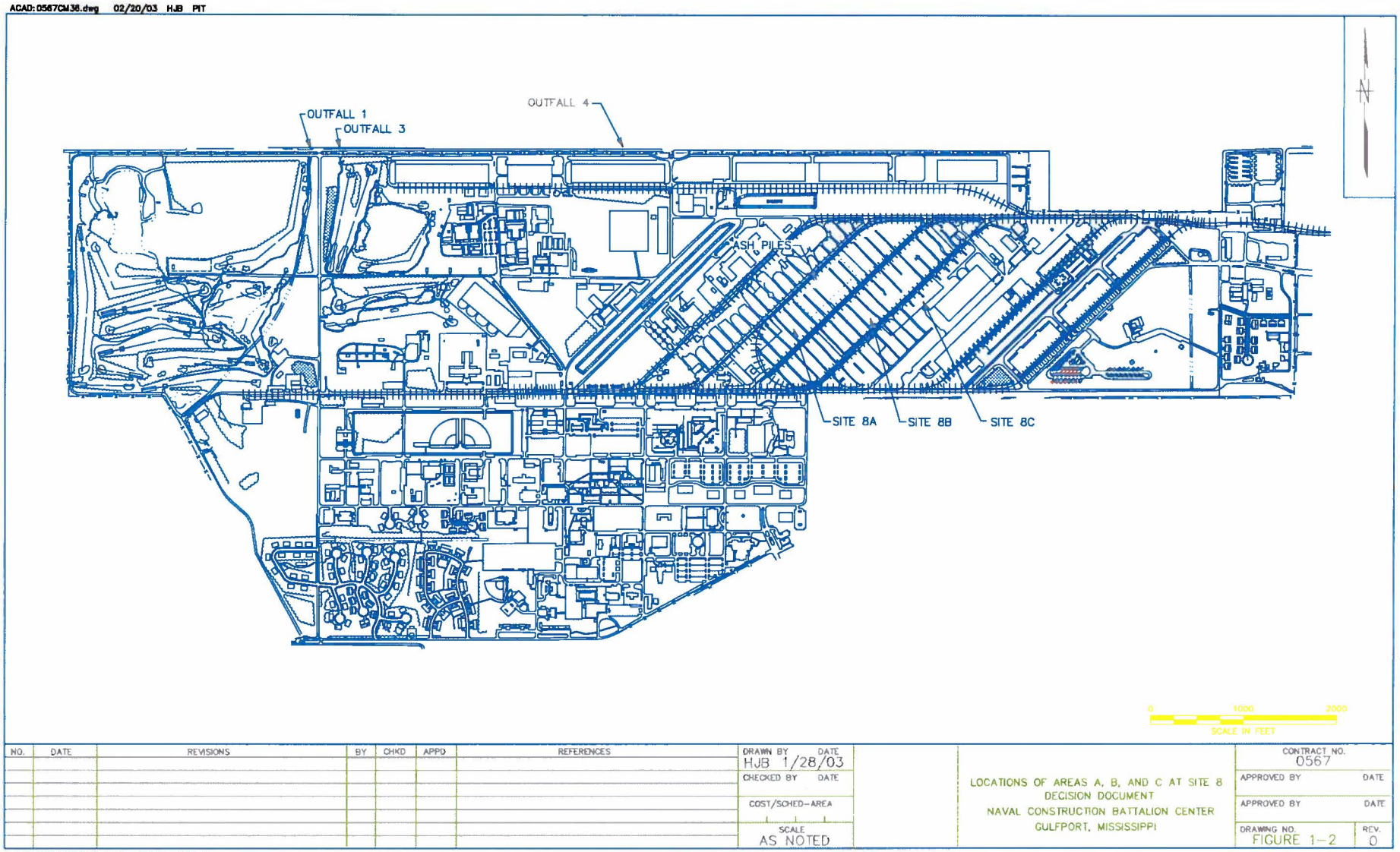

Figure 2-1
Off-Base HO-Contaminated Areas

ACAD: 0567CM21.dwg 11/28/01 HJB

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 7/27/01
CHECKED BY DATE
COST/SCHED—AREA
SCALE AS NOTED

OFF BASE SOIL/SEDIMENT AREAS
DECISION DOCUMENT
NAVAL CONSTRUCTION
BATTALION CENTER
GULFPORT, MISSISSIPPI

CONTRACT NO. 0567
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2-1
REV. 0

FORM CADD NO. SHIV_3HJDWG - REV 0 - 1/20/98

Figure 2-2
Drainage Areas at Site 8

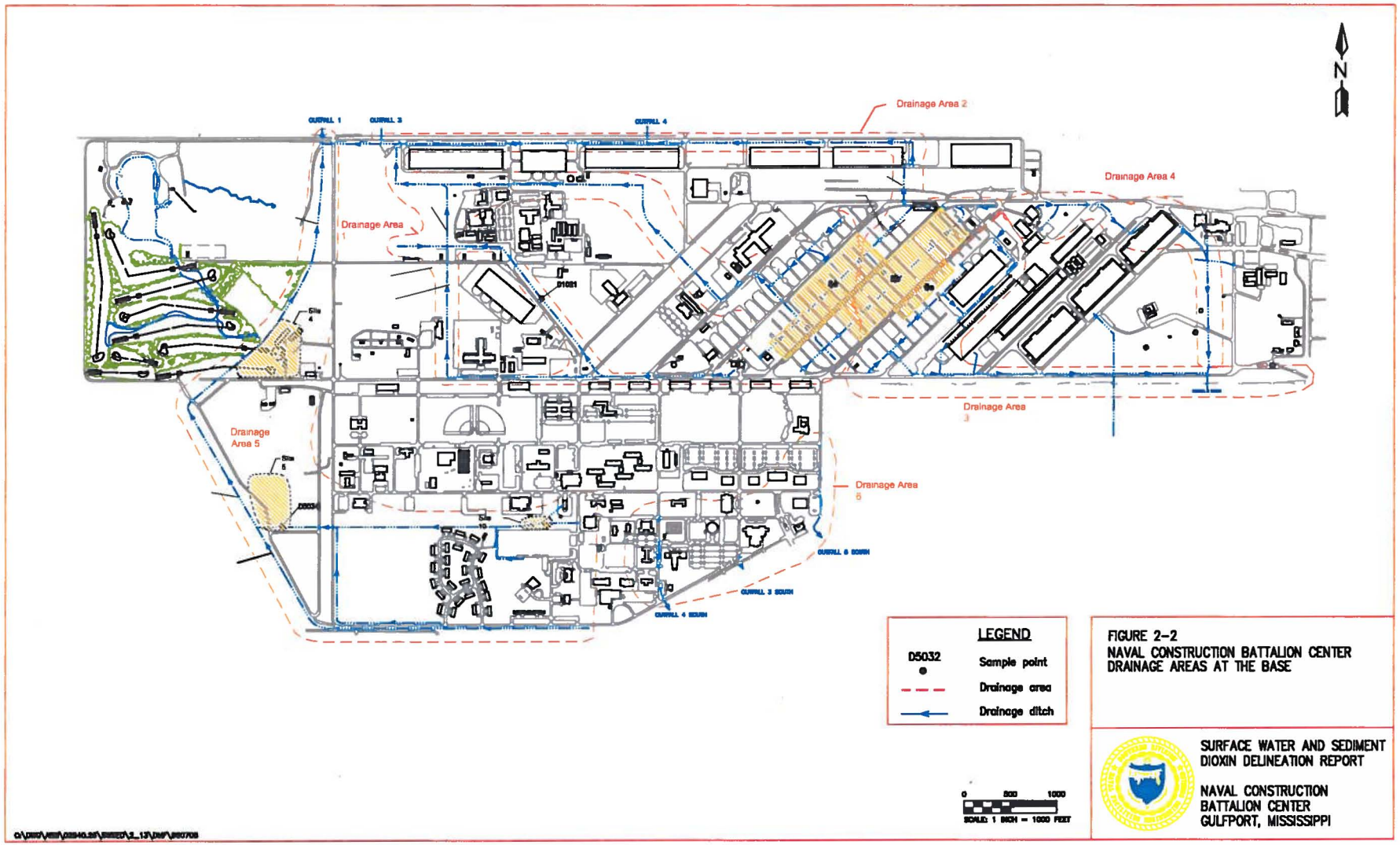

Figure 2-3
Risk-Based Conceptual Site Model (On-Base Area)

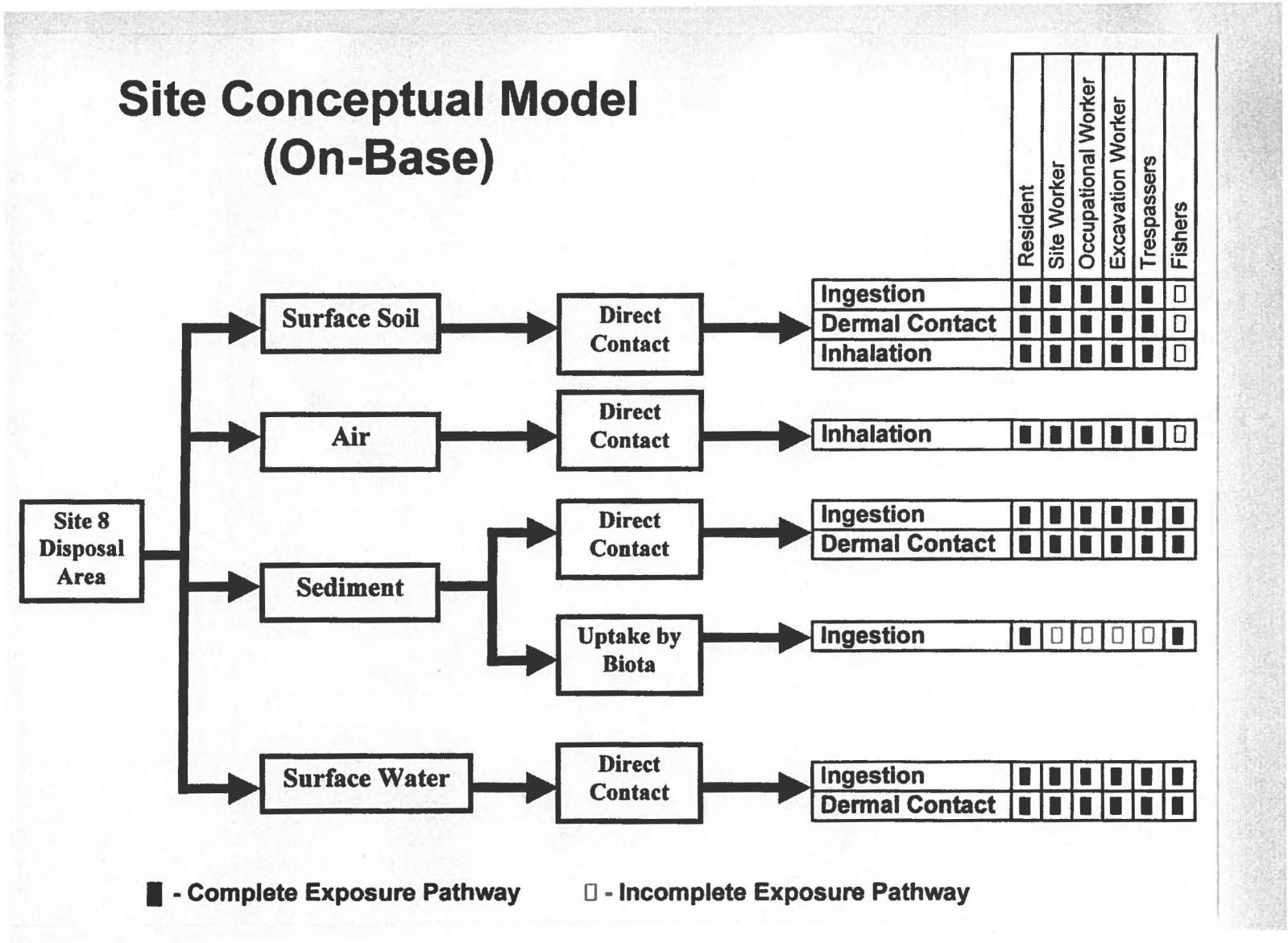

Figure 2-4
Risk-Based Conceptual Site Model (Off-Base Area)