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NCBC GULFPORT
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DECISION DOCUMENT FOR SITE 1 DISASTER RECOVERY AREA REVISION 1 NCBC GULFPORT MS
9/22/2014
TETRA TECH

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Site 1 – Disaster Recovery Disposal Area at Naval Construction Battalion Center (NCBC) Gulfport, Gulfport, Mississippi.

1.2 STATEMENT OF BASIS AND PURPOSE

This Decision Document (DD) presents the selected remedy for previously land filled wastes and associated contaminated soils and groundwater at Site 1 – Disaster Recovery Disposal Area (see Figure 1-1) chosen by the United States Department of the Navy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). As further detailed below, the selected remedy includes limited soil removal; maintenance of the existing landfill soil cover; monitoring of site groundwater; and the application of land use controls to preclude cover disturbance, incompatible land uses, or exposure to site groundwater. This DD documents the final remedial action for this site and does not include or affect any of the other sites at NCBC Gulfport. This decision is based on information contained in the Administrative Record for the site. Information not specifically summarized in this DD or its references but contained in the Administrative Record has been considered and is relevant to the selection of the remedy; thus, the DD is based upon and relies upon the entire Administrative Record file for the site in making the decision. As a supporting agency under CERCLA, the Mississippi Department of Environmental Quality (MDEQ), acting on behalf of the State of Mississippi, has reviewed this document and concurs in the remedy selected herein.

1.3 ASSESSMENT OF SITE

The response action selected in this DD is necessary to protect the public health and welfare and the environment from actual or threatened releases of hazardous substances into the environment. A CERCLA action is required because the contents of the landfill and concentrations of dieldrin in soil and tetrachloroethene, iron, manganese, and thallium in groundwater pose unacceptable risk to human health under current and hypothetical future land use scenarios. Dieldrin in surface soil also poses unacceptable risk for ecological receptors. The selected remedy proposes to manage the waste in place to be consistent with Section 300.430(a)(iii)(B) of the NCP, which contains the expectation that engineering and administrative controls, such as containment and land use controls (LUCs), will be used for waste that poses a relatively low long-term threat where treatment is impracticable.

1.4 DESCRIPTION OF SELECTED REMEDY

The remedy selected for the Site 1 landfill is based in large part upon established United States Environmental Protection Agency (USEPA) "presumptive remedy" guidance for the selection of appropriate CERCLA remedies at closed military landfill sites. That guidance entitled "Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (December 1996)" relies upon previously conducted scientific and engineering evaluations of remedy performance data at municipal landfill sites nationwide by the USEPA. It encourages the use of certain preferred technologies for qualifying historical landfill sites. This allows for an increased consistency in the timely investigation and implementation, where needed, of protective yet cost effective remedies for such sites. The Navy, with MDEQ concurrence, has determined that the tailored presumptive remedy selected is the best remedial approach for Site 1, based upon the age and location of that landfill, characteristics of the materials previously disposed in the landfill (primarily household, commercial, and industrial solid wastes), and sampling data evidencing a lack of significant methane gas emissions and low concentrations of contaminants in the surficial aquifer beneath the facility.

FIGURE 1-1. FACILITY MAP

The specific components of the selected remedy for Site 1 include the following:

- Excavation and disposal of dieldrin contaminated soil with restoration of a 2-foot minimum thickness soil cover to preclude direct contact with buried waste;
- Maintenance of the existing 2-foot minimum thickness soil cover to preclude direct contact with buried waste and prevent future migration of impacted soils;
- Maintenance/improvement of the existing surface water drainage to reduce ponding in areas of buried waste;
- LUCs to prohibit unrestricted uses, to prohibit landfill cover disturbance, and prevent the future use of groundwater.
- Monitoring of site groundwater to detect potential off-site migration of contaminants.

The selected remedy is expected to achieve substantial long-term risk reduction and allow the property to be used for its current and reasonably anticipated future land use, which is for Seabee field training exercises. This DD documents the final remedial action for Site 1 and does not include or affect any other sites at the facility. Implementation of this remedy will allow reuse of the site that does not disturb the landfill cover, which is consistent with current use and the overall cleanup strategy for NCBC Gulfport of restoring sites to support base operations where possible.

1.5 STATUTORY DETERMINATIONS

To fulfill the requirements of CERCLA Section 121 and the NCP, reliance upon a suitably tailored application of the USEPA's complete presumptive remedy for the Site 1 landfill is appropriate for the following reasons:

- Risks are low level except for hot spots. Soil, groundwater, surface water, and sediment data collected during the remedial investigation (RI) in 2008 indicated that concentrations of most analytes were less than MDEQ target remediation goals (TRGs).
- Treatment of wastes is usually impractical due to the volume and heterogeneity of the waste. The majority of the material identified at Site 1 was non-hazardous debris and household-type wastes, which were incinerated during landfill operations. Treatment options include excavation and incineration or relocation to another landfill, neither of which provides more protectiveness than allowing the waste to remain in place.
- Waste types include household, commercial, nonhazardous sludge, and industrial waste solids. The Initial Assessment Study (IAS) reported that an unknown amount of non-hazardous solids and debris were disposed in cells across the site, and that the waste was generated from on-site operations.
- Lesser quantities of hazardous wastes are present as compared to municipal wastes. The hot spots at the site represent a very small volume of the total waste. Additionally, based upon analytical data collected to date, the majority of the waste is unlikely to exhibit hazardous waste characteristics.
- Land application units, surface impoundments, injection wells, and waste piles are not included. There is no reported history or any visual evidence of these at Site 1.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site in excess of levels that allow for unrestricted use and unrestricted exposure, a statutory review will be conducted every five years after initiation of the remedial action in conjunction with the remainder of the

sites at NCBC Gulfport. The five-year reviews will continue until the site is returned to a condition allowing unrestricted use and unrestricted exposure.

1.6 DD Data Certification Checklist

The locations in Section 2.0, Decision Summary, of the information required to be included in the DD are summarized in Table 1-1. Additional information can be found in the Administrative Record file for NCBC Gulfport.

Table 1-1. Decision Document Data Certification Checklist

Data	Location in Decision Document
Constituents of concern (COCs) and their respective concentrations	Sections 2.5 and 2.7
Baseline risk represented by the COCs	Section 2.7
Cleanup levels established for COCs and the basis for these levels	Sections 2.7 and 2.8
How source materials constituting principal threats are addressed	Section 2.11
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the risk assessment	Section 2.6
Potential land and groundwater uses that will be available at the site as a result of the selected remedy	Section 2.12.3
Estimated capital, operating and maintenance (O&M), and total net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Appendix A
Key factors that led to the selection of the remedy	Section 2.12.1

If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this DD and is shown to be a result of Navy activities, the Navy will undertake the necessary actions to ensure continued protection of human health and the environment.

1.7 Authorizing Signature

11SEP14

P. J. Odenthal
CAPT, CEC, USN
Commanding Officer, NCBC

Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

NCBC Gulfport is located on the western side of the City of Gulfport in Harrison County, Mississippi, and is a shore activity under the Commander in Chief, United States Atlantic Fleet, with a mission to support operating units of the Naval Construction Force including Naval Mobile Construction Battalions (NMCBs) One, Eleven, Seventy-four, and One Thirty-Three, the Naval Construction Group Two, Naval Construction Training Center (NCTC), and other smaller tenant activities. The mission of the facility is to prepare for and support all facets of the mobilization of naval construction forces including reserve units. NCBC Gulfport is also responsible for preservation and storage of war reserves including construction equipment and materials.

Site 1 is a former landfill facility of approximately 13.5 acres located north of 7th Street and east of Colby Avenue (see Figure 2-1). The landfill was reportedly in operation from 1942 to 1948. According to available information, Site 1 was the primary area for waste disposal on base and waste was disposed in unlined trenches and then buried. Reportedly, the trenches were deeper than 8 feet, and standing water was present in the open trenches. The landfill received wastes generated at NCBC Gulfport mainly from public works shops and the supply department. Waste fuel, oil, solvents, paint, and paint thinners (reportedly in 55-gallon drums in many cases) were transported to the site and buried in the trenches. The waste disposal area at Site 1 was covered with soil when disposal activities ceased in 1948. Additional fill was added over the years as parking lots and roads have been constructed over the surface.

This area has most recently been used as a mock disaster recovery training village and a training facility. Most of the training buildings have been removed from the site. Building 109, an office building, is located at the northeastern corner of the area. Two open-air vehicle storage yards are present in the southeastern area of the site. The majority of the area currently is not in use and is potentially planned for future use as a field training area for base personnel.

Site 1 is bordered on the northern and western sides by roads beyond which are facilities of the former Pine Bayou golf course, on the eastern side by a motor pool, and on the southern side by 7th Street beyond which is a grassy area.

NCBC Gulfport is an active facility, and environmental investigations and remediation at the facility are funded under the Environmental Restoration, Navy program. Consistent with the NCP including 40 Code of Federal Regulations (CFR) Part 300.5, the Navy serves as lead agency for CERCLA activities at the facility and MDEQ, on behalf of the State of Mississippi, serves as a support agency.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Table 2-1 provides brief summaries of previous investigations at Site 1. Results of these investigations indicated potential risk to human receptors from elevated concentrations of dieldrin in soil and tetrachloroethene, iron, manganese, and thallium in groundwater at the site.

There have been no cited violations under federal or state environmental law or any past or pending enforcement actions pertaining to the cleanup of Site 1.

2.3 COMMUNITY PARTICIPATION

The Navy performs public participation activities in accordance with CERCLA and the NCP throughout the site cleanup process at NCBC Gulfport. The Navy has a comprehensive community relations program for NCBC Gulfport, and community relations activities are conducted in accordance with the NCBC Gulfport Community Involvement Plan. These activities include regular technical and Restoration Advisory Board (RAB) meetings and the establishment of an Information Repository at the local library for dissemination of information to the community.

FIGURE 2-1. LOCATION MAP

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
IAS	1985	Included a records search, on-site survey, site ranking, and an outline for the confirmation study. Nine potentially contaminated sites were identified, and six sites were recommended for confirmation study.
Verification Report (Confirmation Study)	1987	Included a geophysical survey to identify landfill boundaries and installation of three monitoring wells for Site 1. Surface water and sediment samples were collected from three locations at Site 1 (in the drainage ditch adjacent to Colby Avenue, in the training village, and in the catfish ponds) and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, herbicides, and metals. No significant contamination was detected in the groundwater, surface water, or sediment; however, only one of the monitoring wells was located downgradient of the waste disposal area.
Basewide Groundwater, Surface Water, and Sediment Sampling Program	1995	Investigated groundwater conditions at the six sites identified in the IAS and surface water and sediment quality in the NCBC Gulfport drainage systems. The samples were analyzed for VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, petroleum hydrocarbons, and dioxins/furans.
Field Verification Action	1997	Geophysics and direct-push technology sampling to evaluate the extent of buried waste at Site 1.
Groundwater Monitoring Investigation	1999	Included installation and sampling of two downgradient monitoring wells at Site 1. Groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, and dioxins/furans. The results suggested that no significant levels of contamination were migrating off site via groundwater.
Site 1 RI Field Investigations and Building Demolition and East Ditch Soil Investigations	2008	RI fieldwork included geophysical, soil gas, and landfill gas surveys as well as soil, groundwater, surface water, and sediment sampling. Surface and subsurface soil samples were collected from locations across the site. Surface water and sediment samples were collected from the ditches adjacent to the east and west sides of the site. Twenty-two monitoring wells were installed and sampled. Environmental samples were analyzed for VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, and metals. Additional investigations included a soil assessment at the foundations of the nine existing buildings (formerly located on at Site 1) to identify potential impacts to base construction projects and in the western bank of the eastern drainage ditch at Site 1. PCBs found in the eastern ditch area were excavated and disposed of during the subsequent construction project. Data from these investigations were incorporated into the RI.
Landfill Cover Assessment	2012	Included measurement of cover thickness under current site conditions and measurement of existing cover material properties including vertical hydraulic conductivity and grain size. Data from this investigation were incorporated into the RI.
Final RI	2013	RI data were used to conduct a quantitative Human Health Risk Assessment (HHRA) and Screening-Level Ecological Risk Assessment (SLERA). The final RI identified risk to human and ecological receptors in surface soil and risk to human receptors in groundwater, as well as the inherent risk of buried waste at the site, indicating the action was required.
Draft Feasibility Study (FS)	2013	Included identification of Remedial Action Objectives (RAOs) and the development and evaluation of remedial alternatives. Established the suitability of the presumptive remedy including focused excavation, waste containment, LUCs, and long-term monitoring (LTM).
Proposed Plan	2014	Presented the Navy's initial proposed waste containment presumptive remedy consistent with Section 117 (a) of CERCLA and Section 300.430(f)(2) of the NCP to involve the community in the site remedy decision-making process.

The Navy organized the RAB in October 1994 to review and discuss NCBC Gulfport environmental issues with local community officials and concerned citizens. The RAB consists of representatives of the

Navy, MDEQ, and members of the community. The RAB has met frequently since its inception and now meets quarterly. Site 1 investigation activities, results, and associated remedial decisions have been discussed at RAB meetings.

The NCBC Gulfport Information Repository is located at the Gulfport Public Library, 1708 25th Avenue, Gulfport, Mississippi 39501. Documents and other relevant information relied on in the remedy selection process are available for public review at the Information Repository, which includes a copy of the Administrative Record. For access to the Administrative Record or additional information about the Environmental Restoration (ER) Program at NCBC Gulfport, contact Gordon Crane, Restoration Manager, Naval Construction Battalion Center, 2401 Upper Nixon Avenue, Gulfport, Mississippi 39501, (228) 229-0446.

In accordance with Sections 113 and 117 of CERCLA, the Navy provided a public comment period from April 18 to May 18, 2014, for the proposed remedial action described in the Proposed Plan for Site 1. A public meeting to present the Proposed Plan was held on April 17, 2014, at the Isiah Fredericks Community Center. Public notice of the meeting and availability of documents were published in the Gulfport Sun-Herald on April 13, 2014.

2.4 Scope and Role of the Action

Site 1 is part of a comprehensive environmental investigation and cleanup program currently being performed at NCBC Gulfport. The ER Program cleanup activities are being performed under CERCLA guidance. Eleven ER sites have been identified at NCBC Gulfport including five former landfills. Remedial actions have been completed at six sites (Sites 3, 4, 5, 6, 8, and 10), and LTM activities are being conducted. The RIs for Sites 1 and 2 have been completed, and investigations are underway for Site 7. Site 9 was initially included in the ER Program, but was later determined not to warrant further investigation.

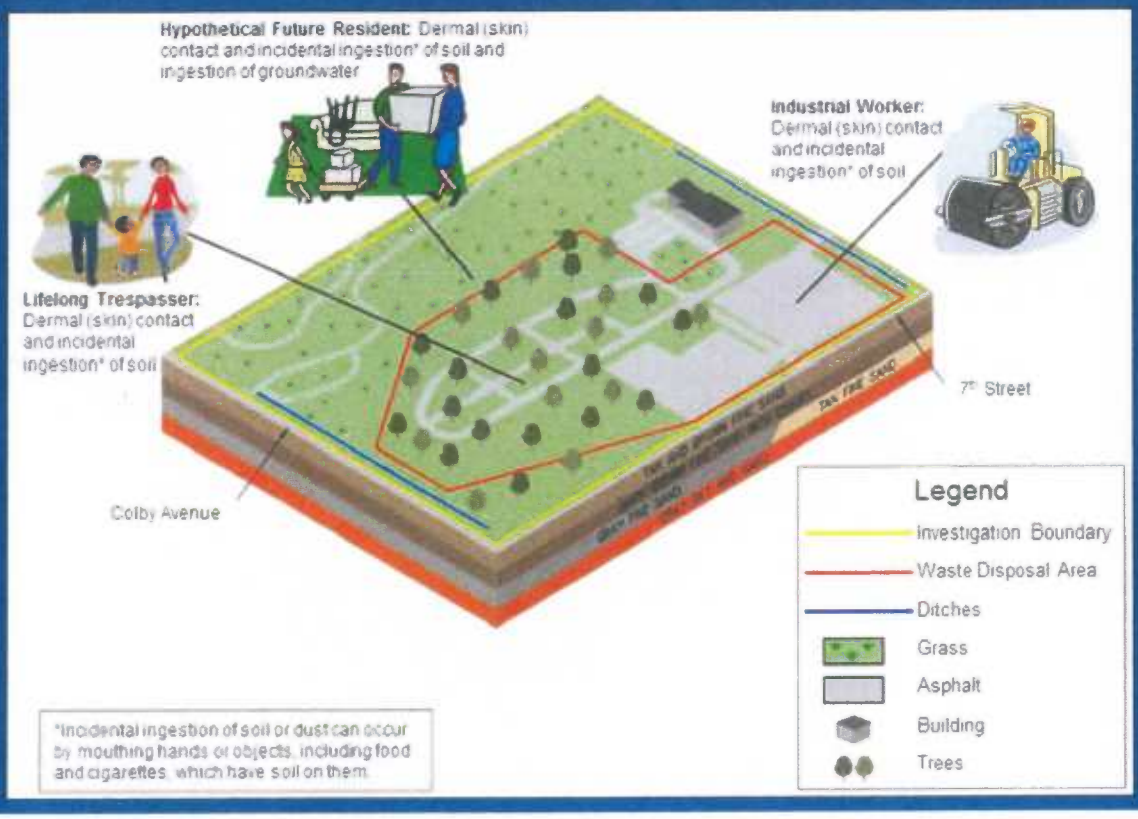
Investigations at Site 1 indicated the presence of buried waste material and soil contamination from past operating practices that may pose unacceptable risk to current and potential future human receptors and to ecological receptors. Previous actions taken in response to the contamination at Site 1 are summarized in Table 2-1. The remedy documented in this DD will achieve the RAOs for Site 1 as listed in Section 2.8. Implementation of this remedy will allow non-residential reuse of the site, which is consistent with current and reasonably anticipated future use and the overall cleanup strategy for NCBC Gulfport of restoring sites to support base operations.

2.5 Site Characteristics

Figure 2-2 presents the Site 1 Conceptual Site Model (CSM), which identifies the waste disposal area, media of concern, and receptors under current and future land use scenarios. At Site 1, the waste disposal boundary was established based on the results of a geophysical survey (see Figure 2-3) that indicated an irregularly shaped landfill comprised of smaller disposal cells or trenches. The landfill area defined by the geophysical survey was approximately 13.5 acres, which included the parking areas in the southeastern corner of the site. The parking areas are approximately 4.5 acres, and the grass and tree portion of the site is approximately 9 acres.

Visual observations of the drilling spoils at 58 locations further aided the vertical definition of the waste disposal and soil cover. These findings are consistent with the reported disposal activities at Site 1.

FIGURE 2-2. CONCEPTUAL SITE MODEL



Site 1 is bordered on the northern and western sides by roads beyond which are facilities of the former Pine Bayou golf course, on the eastern side by a motor pool, and on the southern side by 7th Street beyond which is a grassy area.

The site topography is relatively flat with elevations of approximately 20 to 24 feet above mean sea level.

Surface and shallow subsurface soils in the Site 1 area are primarily gray and brown sand to sandy clay with varying amounts of gravel and minor clay horizons. Below the landfill material, typical lithologies are light brown and gray fine sands and silty fine sands. These strata are typical of Pleistocene and Recent terrace and stream valley deposits. Some horizons contain stringers of fine, subrounded, quartz gravel, or shell fragments to depths of up to 20 feet.

The top of a gray silty clay and clay unit is encountered at approximately 30 feet, depending on site topography. This clay-rich layer is persistent across the site with a thickness 5 feet. Below the gray clayey sand layer, gray silty sand and sand lithologies are present at depths ranging from 35 to 40 feet. This sand unit is 5 to 10 feet thick over most of the site but pinches out and is absent at the eastern end of the site.

At approximately 40 feet below land surface (bls), a much more plastic green-gray clayey silt layer was encountered. This layer is persistent across the site and, based on other sites investigated at NCBC Gulfport, ranges from 10 to 50 feet thick. This layer may represent an aquitard that separates the shallow surficial aquifer from deeper water bearing units of the Citronelle Formation and Graham Ferry Formation, which typically occur at depths greater than 200 feet.

Surface water runoff is to ditches bordering the eastern and western sides of Site 1. Water in these ditches flows to the north and then west to Canal No. 1, the primary drainage ditch for the western portion

FIGURE 2-3. GEOPHYSICAL INVESTIGATION RESULTS

of NCBC Gulfport. As part of the Turkey Creek drainage basin, Canal No. 1 is a year round stream that exits the base at Outfall 1. Canal No. 1 continues north from NCBC Gulfport along Canal Road until it joins Turkey Creek. From there, surface water is conveyed to the east until it enters Gulfport Lake and the Back Bay of Biloxi.

Two surface water bodies are adjacent to Site 1 and may receive or have the potential to receive surface water runoff from the site and have an influence on the hydrology of the surficial aquifer. The primary drainage ditch on the eastern boundary of Site 1 conveys a large portion of the runoff for the central portion of NCBC Gulfport but, due to topography, receives little runoff from Site 1. The ditch on the western boundary of Site 1 parallels Colby Avenue and receives the majority of the runoff from Site 1. Surface water drainage at the site is poor and ponding occurs in the basins between the roads on site. Both of the ditches at Site 1 drain to Canal No. 1 in the northwest part of the base.

As part of the Turkey Creek drainage basin, Canal No. 1 is a year round stream that flows north and exits the base at Outfall 1. Canal No. 1 continues north from the base along Canal Road until it joins Turkey Creek. From there, surface water is conveyed to the east until it enters Gulfport Lake and the Back Bay of Biloxi.

2.5.2 Nature and Extent and Fate and Transport of Contamination

Analytical results for samples collected from Site 1 were screened against MDEQ and USEPA criteria to identify contaminants of potential concern (COPCs) and areas of potential contamination. The media evaluated to determine the nature of contamination at Site 1 included surface soil, subsurface soil, groundwater, surface water, and sediment. The COPCs identified at this stage were further evaluated in the human health and ecological risk assessments in Section 2.7.

The pesticide dieldrin was identified as a COPC for surface soil. Dieldrin concentrations exceeding screening criteria were limited to one surface soil sample location (see Figure 2-4).

Groundwater COPCs included tetrachloroethylene (PCE) and several metals. PCE concentrations exceeding screening criteria occurred at four direct push technology sample locations and one monitoring well location (see Figure 2-5). Iron concentrations exceeding screening criteria were reported at six monitoring well locations. Thallium concentrations exceeding screening criteria were reported at one monitoring well location. Manganese concentrations were reported at four locations exceeding screening criteria (see Figure 2-6).

Arsenic concentrations were detected in two monitoring wells located approximately 300 feet beyond the northwestern portion of the landfill on the golf course). Golf courses typically have used arsenical herbicides to control weed growth. Because elevated arsenic concentrations occur away from the landfill and do not increase at the landfill, arsenic does not appear to be related to waste disposal activities. Elevated iron concentrations were also observed in the wells containing elevated arsenic concentrations. Both of these metals are commonly found in soil and groundwater in this portion of the United States and are believed to be anthropogenic or background values.

Analytical results for surface water and sediment samples suggest that levels reported in Site 1 surface water and sediment reflect base-wide conditions and do not result from releases from the landfill at Site 1.

Based on the evaluation of existing conditions at Site 1, the following potential contaminant transport pathways may exist at the site:

- Leaching of buried waste material and soil contaminants to groundwater
- Surface migration of soil contaminants to surface water or sediment
- Migration of groundwater contaminants and discharge to surface water or sediment
- Volatilization from groundwater and volatilization or particulate migration from surface soil to the atmosphere

FIGURE 2-4. SOIL SAMPLING RESULTS

FIGURE 2-5. GROUNDWATER SAMPLING RESULTS, INORGANICS

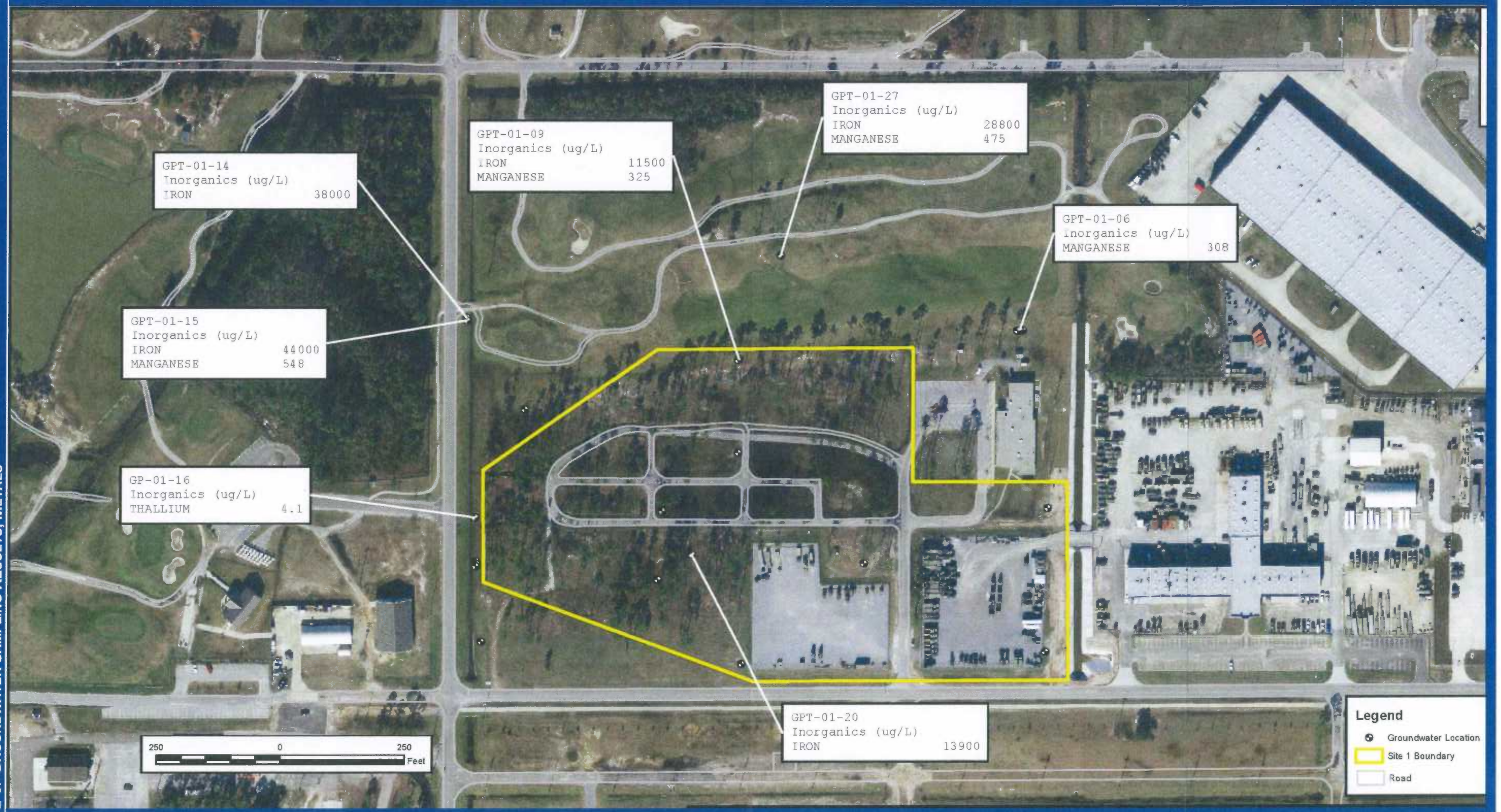


FIGURE 2-6. GROUNDWATER SAMPLING RESULTS, METALS

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

NCBC Gulfport is an active military facility and is expected to remain active for the near future. Tenant activities, including the NMCBs and NCTC, provide training, supply, and logistics support to the Naval Construction Force and other military units. Land use in the areas surrounding NCBC Gulfport varies. To the north along 28th Street, there are light industrial, commercial, and residential areas. The land to the east and southeast is primarily residential with some commercial areas. Residential areas are located west of NCBC Gulfport.

Shallow groundwater underlying NCBC Gulfport is not used for drinking water and is not expected to be used in the future. Water is available in the shallow surficial aquifer, but mineral content is high. The shallow surficial aquifer at NCBC Gulfport is underlain by a green clayey silt unit that limits deeper vertical migration of contaminants. Drinking water for NCBC Gulfport is obtained from three on-site potable water supply wells, which are screened at approximately 700 feet bls. The station is permitted as a Small Community Water supply. Most of the residents of the Gulfport area are supplied from municipal systems drawing water from aquifers including the Citronelle Formation and Graham Ferry Formation (Pliocene) and Pascagoula, Hattiesburg, and Catahoula Formations (Miocene). Boundaries between the aquifers are vaguely defined, if at all. These aquifers are composed of sands and discontinuous clays.

2.7 SUMMARY OF SITE RISKS

The baseline risk assessment estimates what risks the site poses if no action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. A HHRA and SLERA were conducted as part of the Site 1 RI.

2.7.1 Summary of Human Health Risk

The quantitative HHRA was conducted using chemical concentrations detected in soil, groundwater, surface water, and sediment samples. Key steps in the risk assessment process included identification of contaminants of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization.

Identification of COPCs

Table 6-13 from the RI (included in Appendix B) presents exposure point concentrations (EPCs) for the COPCs identified at Site 1. EPCs are the concentrations used in the risk assessment to estimate exposure and risk from each COPC. For each COPC, information in the table includes the range of detected concentrations, frequency of detection (i.e., the number of times the contaminant was detected in samples collected at the site), EPCs, and how EPCs were derived. Based on the statistical distributions of the data and the results of preliminary calculations, maximum detected concentrations or 95 percent upper confidence limits on the mean were used as the EPCs for the Site 1 COPCs.

Exposure Assessment

During the exposure assessment, current and potential future exposure pathways through which humans might encounter the COPCs identified in the previous step were evaluated. The results of the exposure assessment for Site 1 were used to refine the CSM (see Figure 2-2), which identifies potential contaminant sources, contaminant release mechanisms, transport routes, and receptors under current and future land use scenarios. Surface soil and groundwater were identified as the media of concern for the COPCs. Potential exposure routes for soil include incidental ingestion (swallowing small amounts of soil) and dermal contact (skin exposure). The HHRA considered receptor exposure under nonresidential land use (construction, maintenance, and industrial workers and trespassers) and future hypothetical residential land use. Current and hypothetical future exposure pathways at Site 1 are summarized in Table 2-2.

TABLE 2-2. RECEPTORS AND EXPOSURE ROUTES EVALUATED IN THE HHRA	
RECEPTOR	EXPOSURE ROUTE
Maintenance Workers (current and future land use)	Soil/sediment/surface water/groundwater dermal contact Soil/sediment/surface water ingestion Inhalation of soil Inhalation of volatiles from groundwater
Construction/Excavation Workers (future land use)	Soil/sediment/surface water dermal contact Soil/sediment/surface water ingestion Inhalation of soil Inhalation of volatiles from groundwater
Trespassers (adult and adolescent) (current and future land use)	Soil/sediment/surface water dermal contact Soil/sediment/surface water ingestion Inhalation of soil
On-Base Residents (adults/children) (hypothetical future land use)	Soil/sediment/surface water/groundwater dermal contact Soil/sediment/surface water/groundwater ingestion Inhalation of soil Inhalation of volatiles from groundwater Groundwater vapor intrusion into indoor air
Industrial Workers (current and future land use)	Soil/sediment/surface water dermal contact Soil/sediment/surface water ingestion Groundwater vapor intrusion into indoor air Inhalation of soil

Toxicity Assessment

Toxicity assessment involves identifying the types of adverse health effects caused by exposure to site COPCs and determining the relationship between the magnitude of exposure and the severity of adverse effects (i.e., dose-response relationship) for each COC. Based on the quantitative dose-response relationships determined, toxicity values for both cancer (cancer slope factor) and non-cancer (reference dose [RfD]) effects were derived and used to estimate the potential for adverse effects. The toxicity data is summarized in Tables 6-14 to 6-19 from the RI (included in Appendix B).

Risk Characterization

During the risk characterization, the outputs of the exposure and toxicity assessments were combined to characterize the baseline risk (cancer risks and non-cancer hazards) at the site if no action was taken to address the contamination. Potential cancer risks and non-cancer hazards were calculated based on reasonable maximum exposure (RME) and central tendency exposure (CTE) assumptions. The RME scenario assumed the maximum level of human exposure that could reasonably be expected to occur, and the CTE scenario assumed a median or average level of human exposure.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime because of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

where: risk = a unitless probability (e.g., 2×10^{-5}) of an individual developing cancer
CDI = chronic daily intake averaged over 70 years (in milligrams per kilogram per day [mg/kg-day])
SF = slope factor (in mg/kg-day^{-1})

These calculated risks are probabilities that are usually expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} under an RME scenario indicates that an individual experiencing the reasonable maximum exposure estimate has an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to

be as high as one in three. MDEQ's acceptable risk for site-related exposures is 1×10^{-6}. Tables 6-20 and 6-21 from the RI included in Appendix B present the CTE and RME risks for Site 1.

The carcinogenic risks calculated for the RME case compared incremental lifetime cancer risks (ILCRs) for MDEQ's risk management benchmark (1×10^{-6}). Total ILCRs for hypothetical future residents (adult + child = 5×10^{-4}), adolescent trespassers (2×10^{-6}), and industrial workers (4×10^{-6}) exceeded the MDEQ goal for cumulative site risk. The possible excess cancer risks at Site 1 were attributed to the following:

Industrial worker	Surface soil	Dieldrin
Future child resident	Surface soil	Dieldrin
	Groundwater	PCE
Future adult resident	Surface soil	Dieldrin
	Groundwater	PCE
Lifelong resident	Surface soil	Dieldrin
	Groundwater	PCE

Of the four receptors, the most conservative risk consideration is 46 micrograms per kilogram (µg/kg) for the lifetime resident. The dieldrin concentration at surface soil location 01SS025 exceeds this value (see Figure 1). Note that the other detected dieldrin concentrations were less than the threshold values representing 1.0×10^{-6} ILCR for each of the exposure scenarios. Dieldrin at 01SS25 in surface soil presents unacceptable risk and will be retained as a COC.

The concentrations of PCE detected in Site 1 groundwater samples were less than the maximum contaminant level (MCL) established by the USEPA for drinking water, and the target remediation goal established by the state of Mississippi based on the MCL for PCE of 5 micrograms per liter (µg/L). The site-specific threshold value representing unacceptable risk for the Lifetime Resident Receptor was calculated to be 0.05 ug/L. Since the site specific risk assessment indicates potential risk from PCE, PCE will be retained as a COC, and PCE with its breakdown daughter products will be included in the LTM program.

The carcinogenic risks calculated for the CTE case indicated that ILCRs for site industrial workers and trespassers were less than MDEQ's risk management benchmark (1×10^{-6}), compared to the RME risk. PCE in groundwater was the only cancer risk contributor for hypothetical future lifelong, adult, and child residents.

The potential for non-carcinogenic effects was evaluated by comparing an exposure level over a specified period (e.g., a lifetime) to an RfD derived for a similar exposure period. An RfD represents a level to which an individual may be exposed that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ less than 1 indicates that a receptor's dose of a single contaminant is less than the RfD and that toxic non-carcinogenic effects from that chemical are unlikely. The hazard index (HI) is generated by adding the HQs for all chemicals that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may be reasonably exposed. An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health. The HQ is calculated as follows:

$$\text{Noncancer HQ} = \text{CDI} / \text{RfD}$$

where: CDI = chronic daily intake
RfD = reference dose

CDIs and RfDs are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Cumulative HIs calculated for the RME case for hypothetical future adult and child residents were 6 and 20, respectively. The contributors to the residential HIs were iron, manganese, and thallium in groundwater.

Because iron, manganese, and thallium HIs exceeding human health benchmarks in Site 1 groundwater occur predominantly in monitoring wells outside of the landfill area determined for Site 1, there is uncertainty in the human health risk for exposure to groundwater at the site. Potentially, the metals in those wells may not result from landfill activities at Site 1 and may be due to naturally occurring conditions, a change in soil type, or a different geochemistry in the vicinity of the wells. However, to better define the future risk associated with the metals concentrations in groundwater, iron, manganese, and thallium will be considered COCs. These metals will be included in the LUC and LTM portions of the presumptive remedy until background metals concentrations can be determined or the concentrations are reduced to less than the threshold value.

Risk estimates calculated for ingestion exceed those calculated for the dermal and inhalation routes of exposure. HIs for exposure to surface and subsurface soil, surface water, and sediment were less than unity for all receptors. Cumulative HIs for maintenance workers, industrial workers, construction/excavation workers, adult trespassers, and adolescent trespassers under the RME scenario were less than unity (1), indicating that no toxic effects are anticipated for these receptors under the defined exposure conditions. Target organ-specific HIs for construction/excavation workers, maintenance workers, industrial workers, adolescent trespassers, and adult trespassers under the CTE scenario were less than unity (1), indicating that no toxic effects are anticipated for these receptors under the CTE exposure conditions. In addition, for hypothetical future residents, all HIs for individual target organs are less than or equal to 1.

No major sources of uncertainty, other than those typically associated with risk assessment estimates, were identified for the Site 1 HHRA.

Based on the results of the HHRA, risks were identified that require a response action, including unacceptable risks for site industrial workers and hypothetical residents exposed to dieldrin in soil and hypothetical residents exposed to tetrachloroethene, iron, manganese, and thallium in groundwater.

Although, cancer risk estimates developed for hypothetical residents exposed to soil and adolescent trespassers exposed to sediment exceeded the MDEQ cumulative risk benchmark, the arsenic concentrations (which account for the highest percent of the risk estimates) are typical for Mississippi Coastal Plain Soils. In groundwater, arsenic contributes to excess cancer risk and non-cancer risk; however, arsenic was only detected in two wells beyond the site to the northwest and is not believed to represent Site 1 groundwater conditions.

2.7.2 Summary of Ecological Risk

Tables 7-1 to 7-8 from the RI (included in Appendix B) summarize the ecological risk evaluation for Site 1. The detected contaminants, although possibly associated with Site 1, may also have been transported from other areas of NCBC Gulfport via storm water runoff through ditches adjacent to Site 1. Based on the ecological risk assessment, dieldrin in surface soil was determined to be the only COC requiring remedial action.

Risks to Soil Invertebrates and Plants

Dieldrin was detected in 8 of 20 soil samples with a maximum detected concentration of 460 µg/kg. Because the dieldrin-specific ecological screening values (ESVs) were not developed for the soil invertebrate exposure scenario, dieldrin risk was quantified as a component of the total organochlorine pesticide exposure with an ESV of 100 µg/kg. Dieldrin concentrations at the other locations were less than the ESV. Dieldrin at 01SS25 in surface soil presents unacceptable risk and will be retained as an ecological COC.

Surface soil analytical results were also evaluated to determine risk to plants. Because Site 1 has been maintained as an area of mowed grass for a long period of time, a natural plant community has not been allowed to develop. Therefore, it is unlikely that COCs in the soil have more impact to site plants than mowing, particularly for shrubs, vines, and trees.

The risk associated with the surface soil based on COC maximum concentrations is isolated to locations 01SS10, 01SS17, and 01SS25. Additionally, the location (01SS25) containing the ecological risk due to dieldrin will be remediated due to human health and potential ecological risk. The ecological risk associated with the other COPCs in surface soil is considered minimal. Dieldrin in surface soil will be the only COC included in the remedial action.

Risks to Benthic Invertebrates and Aquatic Organisms

Sediment analytical results were evaluated to determine risk to benthic invertebrates. Surface water results were evaluated to determine risk to aquatic organisms. The ditches adjacent to Site 1 occupy an area of approximately 0.4 acre of submerged habitat. The smaller ditch on the western side of Site 1 has a concrete bottom lining and has flowing water only during storm events. The larger ditch on the eastern side of Site 1 was lined on the bottom and banks with concrete in 2009. Based on the distribution of the contaminants and the small area and general unsuitability of the habitat, the risk to aquatic or benthic receptors at Site 1 was considered to be minimal. Therefore, there are no ecological COCs in surface water sediment for ecological risk.

Risks to Piscivorous Birds and Mammals

Food-chain modeling was conducted to evaluate potential risks to representative piscivorous receptors from ingested doses of sediment and surface water COPCs that are known to bioaccumulate or biomagnify in prey organisms. The food chain HQs were calculated with an area use factor of 1.0, where the representative receptors are assumed to forage exclusively in the water bodies bordering Site 1. The ditches adjacent to Site 1 occupy an area of approximately 0.4 acre of submerged habitat. The smaller ditch on the western side of Site 1 has a concrete bottom lining and has flowing water only during storm events. The larger ditch on the eastern side of Site 1 was lined on the bottom and banks with concrete in 2009. Based on the distribution of the contaminants and the small area and general unsuitability of the habitat, the risk to piscivorous receptors at Site 1 was considered to be minimal.

2.7.3 Basis for Action

Unacceptable human health risks were estimated for hypothetical future residential exposure to soil due to dieldrin and hypothetical residents exposed to tetrachloroethene, iron, manganese, and thallium in groundwater and for ecological receptors exposed to dieldrin in surface soil.

Additionally, the landfilled waste is assumed to present an inherent health risk requiring further action. The groundwater passing through the landfill may represent risk should COC levels increase. Because risks were identified under the current land use scenario and for hypothetical future residential receptors, a response action is necessary to protect the public health or welfare from actual or threatened releases of hazardous substances into the environment that may present an imminent and substantial endangerment to public health or welfare.

2.8 Remedial Action Objectives

RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. RAOs specify the COCs, potential exposure routes and receptors, and acceptable concentrations (i.e., cleanup levels) for a site and provide a general description of what the cleanup will accomplish. RAOs typically serve as the design basis for the remedial alternatives described in Section 2.9. The COC for surface soil is dieldrin.

The RAOs for Site 1 consist of the following:

- **RAO 1:** Prevent direct contact with the landfill waste and soil affected by the landfill, thereby precluding potential unacceptable human exposure(s) to those media.
-
- **RAO 2:** Prevent human and ecological receptor exposure to dieldrin in surface soil.
- **RAO 3:** Prevent direct exposure routes for human receptors to groundwater that has been in contact with buried waste.

These RAOs are based on current and reasonably anticipated future site uses.

Based on data from the RI, the area of contaminated waste and areal extent of the landfill is approximately 410,000 square feet with an estimated volume of 30,370 cubic yards. The extent of the landfill is shown on Figure 2-7.

Based on discussions between the Navy and MDEQ, it was agreed that that remediation goals for the project would be based upon the State of Mississippi TRGs for soil and groundwater. As a result, the MDEQ TRGs will serve as the basis for remedial action. Those TRGs are based upon either 1) a 1×10^{-6} target incremental cancer risk level for each carcinogenic chemical, 2) an HI not to exceed 1.0 for each systemic toxicant, or 3) constituent TRG concentrations established through federal/state programs (e.g., the Safe Drinking Water Act). The State of Mississippi lists TRGs for both restricted (industrial) and unrestricted (residential) land use. Because of the proximity of Site 1 to public access areas, unrestricted (residential) TRGs were deemed appropriate for consideration.

2.9 DESCRIPTION OF ALTERNATIVES

To address potential unacceptable human health risks associated with soil at Site 1, as well as the inherent risk presented by landfill material, a preliminary technology screening evaluation was conducted in the FS. While acknowledging that site specific circumstances must be taken into account, USEPA's presumptive remedy guidance contemplates as default remedial components use of a landfill cap/cover, source area groundwater control to contain any plume, institutional controls to supplement engineering controls, etc. For Site 1 groundwater source control was not deemed necessary.

FIGURE 2-7. LANDFILL BOUNDARY

Per the USEPA (*Data Requirements for Selecting Remedial Action Technology*, USEPA, 1987), the use of active gas collection/venting systems is appropriate only when vadose zone methane concentrations exceed either 1) less than the 5% methane or 2) 25% Lower Explosive Limit in or at onsite structures. A landfill gas evaluation conducted at Site 1 in 2008, did not detect landfill gas at levels exceeding instrument detection limits; thus, construction of an active collection/venting system was also not deemed necessary.

The initial general response actions are presented in Table 2-3. In-situ treatment options were not considered based on the type and volume of contamination (e.g., buried waste material) at Site 1. The initial efforts evaluated in the FS included installing a low permeability cap with a landfill gas venting system. During the decision-making process, however, discussions amongst the NCBC Gulfport Partnering Team ensued about the landfill trenches being located within or near a flood plain. The result of the discussions included the understanding that a low permeability cover and gas venting system was not necessary. The Navy and MDEQ determined that a minimum 2-foot of soil with a vegetative cover would sufficiently prevent human and ecological exposure and would not result in landfill gas accumulation, thus negating the need for landfill gas monitoring.

TABLE 2-3. GENERAL RESPONSE ACTIONS

GENERAL RESPONSE ACTION	TECHNOLOGY	PROCESS OPTIONS
No Action	None	Not applicable
Limited Action	LUCs	Administrative controls: deeds and site use restrictions. Maintenance of existing cover.
Removal	Excavation	Removal of contaminated soil.
Containment	Cap/Cover	Native soil cover system. Single barrier cover system.
Monitoring	Engineering controls	Long-term groundwater monitoring, landfill gas monitoring.
Landfill Gas Control	Landfill gas collection and treatment	Landfill gas management. Landfill gas to energy.

Since the Site 1 landfill qualifies for application of the USEPA's presumptive remedy guidance for military landfills, technology screening was not utilized prior to developing site remedial alternatives and the presumptive remedy was only compared to the USEPA's required No Action Alternative. Consistent with the NCP, the no action alternative was evaluated as a baseline. Table 2-4 describes the revised major components of the selected remedy. The estimated costs for the remedial alternative evaluated for Site 1 were based upon the alternative as described in the FS.

TABLE 2-4. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

ALTERNATIVE	COMPONENTS	DETAILS	COST
No Action *No action to address contaminated soil and groundwater and no use restrictions*	None	No action.	No cost
Presumptive Remedy (Focused Action) *Hot spot removal, existing soil cover and site use controls to preclude exposure to buried wastes, contaminated soil and groundwater along with future site monitoring*	Excavation	Remove dieldrin-contaminated soil for off-site disposal, replace with clean fill.	**Capital:** $251,000 **Annual O&M Cost:** $47,000 **30-Year NPW:** $910,000 **Time Frame:** 30 years
	Waste Containment	Existing soil/vegetative cover to contain waste and minimize exposure.	
	LUCs	Restriction to prevent residential land use. Prohibition on the use of groundwater or excavation of soil. Requirement to maintain integrity of soil/vegetative cover.	
	Long-term Groundwater Monitoring	Collect and analyze groundwater samples from 12 monitoring wells for selected parameters (estimated at 30 years).	
Presumptive Remedy (Comprehensive Action) *Source containment and site use controls to preclude exposure to buried wastes, contaminated soil and groundwater along with future site monitoring.*	Excavation	Remove dieldrin-contaminated soil, segregate for inclusion beneath the cap, relocate to an area beneath the low permeability cap, and replace with clean fill.	**Capital**: $4,352,000 **Annual O&M Cost**: $49,000 **30-Year NPW**: $5,064,000 **Time Frame**: 30 years
	Waste Containment	Compacted clay cap to contain waste, minimize infiltration and minimize exposure.	
	LUCs	Restrictions to prevent residential land use. Prohibition on the use of groundwater or excavation of soil. Requirement to maintain integrity of soil/vegetative cover.	
	Long-term Groundwater Monitoring	Collect and analyze groundwater samples from 12 monitoring wells for selected parameters (estimated at 30 years).	

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 2-5 and subsequent text in this section summarize the comparison of the remedial alternatives with respect to the nine CERCLA remedy selection criteria outlined in the NCP at 40 CFR 300.430(e)(9)(iii) and which are categorized as either threshold, primary balancing or modifying. Further information on the detailed comparison of remedial alternatives is presented in the Site 1 FS.

TABLE 2-5. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

CERCLA CRITERION	NO ACTION	FOCUSED EXCAVATION, MAINTAIN EXISTING SOIL COVER, STORM WATER DRAINAGE IMPROVEMENTS, LUCS, AND GROUNDWATER MONITORING	SOIL COVER/CAP, LUCS, LANDFILL GAS MONITORING, AND GROUNDWATER MONITORING
Overall Protection of Human Health and the Environment	○	●	●
Compliance with ARARs	○	●	●
Long-term Effectiveness and Permanence	○	●	●
Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	○
Short-term Effectiveness	○	●	●
Implementability	●	●	●
Total Cost (NPW)	No cost	$910,000	$5,064,000
State Acceptance	○	●	●
Community Acceptance	○	●	●

● - Achieves criteria. ○ - Does not achieve criteria.

Threshold Criteria

Overall Protection of Human Health and the Environment. The No Action alternative would not achieve the RAOs and, therefore, does not protect human health and the environment. The focused and comprehensive action alternatives would prohibit future use associated with unacceptable human health risk, providing protection of human health and the environment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. The No Action alternative would not meet any ARARs. The focused and comprehensive action alternatives would meet all chemical-, location-, and action-specific ARARs to the extent they exist.

Primary Balancing Criteria

Long-term Effectiveness and Permanence. The No Action alternative would not have long-term effectiveness or permanence. The focused and comprehensive action alternatives would have long-term effectiveness and permanence because it would cover the waste to would prevent direct exposure and limit future migration of contaminants. LUCs would prevent disturbance of the landfill cover and use of groundwater. LTM would detect migration of contaminants from the site.

Reduction in Toxicity, Mobility, or Volume through Treatment. None of the alternatives would utilize direct treatment to reduce the toxicity, mobility, or volume of hazardous substances. Because of the type of contamination at Site 1 and its relatively low long-term risk based on current and anticipated future site use, direct treatment was deemed impracticable.

Short-term Effectiveness. The No Action alternative would not pose any risks to on-site workers or result in short-term adverse impact to the local community and the environment. Excavation and handling of impacted soil under the focused and comprehensive action alternatives would pose short-term risks because on-site activities would involve a greater opportunity for exposure of remediation workers to contaminated soil. The use of personal protective equipment, monitoring equipment, and observance of Occupational Safety and Health Administration guidelines would address these concerns. Dust, stormwater and erosion, noise abatement, and other construction-related issues would be addressed and

control measures implemented during construction activities. The time to complete the excavation alternative and meet the RAOs is estimated to be approximately one year.

Implementability. The No Action alternative would be readily implementable. The technical feasibility criteria, including constructability, operability, and reliability, are not applicable. Implementability of administrative measures is not applicable because no such measures would be taken.

The focused and comprehensive action alternatives are implementable. Excavation and earthmoving equipment considered under this alternative is typical in the construction industry and readily available from several local sources. Off-site borrow locations for clean soil can be identified. Establishment of LUCs would require negotiation and agreement on the specifics of the procedures between the Navy and regulatory agencies.

Cost. There would be no costs associated with the No Action alternative. The estimated present-worth cost to implement the focused action alternative is $910,000 and the comprehensive action alternative is $5,064,000.

Modifying Criteria

State Acceptance. State involvement has taken place throughout the CERCLA remedy development process, including multiple discussions during NCBC Gulfport Partnering Team Meetings. During the meeting held on April 10 and 11, 2012, the Partnering Team further discussed the presumptive remedy alternative, given the proximity of the landfill to a flood plain. The end result of that discussion was to eliminate the need for the low permeability cap and any landfill gas venting system as components of the final presumptive remedy, and the action considered the use of a 2-foot soil/vegetative cover to protect human health. Evaluating the revised approach with respect to the Threshold and Primary Balancing Criteria yields similar results to using the low impermeability cap. The most significant change was in the cost criteria. MDEQ concurs with recommending the Focused Action as the Preferred Alternative, the No Action Alternative would not be an acceptable remedy.

Community Acceptance. No written questions were received during the formal public comment period for the Proposed Plan. The questions raised at the public meeting on October 21, 2013, were general inquiries for informational purposes only; no objections to the proposed alternative were voiced. These questions and the Navy's responses thereto are discussed in Section 3.0.

2.11 PRINCIPAL THREAT WASTE

The NCP at 40 CFR 300.430(a)(1)(iii)(A) establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable. Principal threat wastes are those source materials considered highly toxic, highly mobile that generally cannot be reliably contained, or that would present a significant risk to human health or the environment should exposure occur. A source material is a 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. At Site 1, the contaminant concentrations are not highly toxic or highly mobile; therefore, principal threat wastes are not considered to be present at the site.

2.12 SELECTED REMEDY

2.12.1 Rationale for Selected Remedy

The presumptive remedy for waste containment at military landfills was selected for Site 1 because the site meets the appropriate qualifying criteria under applicable Department of Defense and USEPA guidance and because once implemented, the remedy will achieve the identified RAOs.

The principal factors in the selection of this remedy included the following:

- Implementation will preclude unacceptable risk to human and ecological receptors in a relatively short period (estimated 1 year for construction).
- The remedy would be consistent with the reasonably anticipated future use(s) of the site.

2.12.2 Description of Selected Remedy

The selected remedy consists of a focused excavation at the dieldrin hot spot, ensuring restoration of the site with a vegetative cover, monitoring for groundwater and LUCs. The LUCs to be implemented would prevent residential development, the withdrawal or use of groundwater, or excavation of the area without proper controls. Periodic site inspections would be used to ensure that the integrity of the vegetative cover has not been compromised and to determine maintenance needs to ensure the acceptable performance of the soil cover. The soil cover would consist of a minimum of 2 feet of clean soil with vegetation maintained to limit erosion. Figure 2-8 shows the LUC and groundwater restriction boundaries.

FIGURE 2-8. LUC BOUNDARY AND COORDINATES

Location	Easting	Northing
1	889104.38	319610.36
2	889615.27	319621.85
3	889613.62	319353.38
4	889926.12	319354.69
5	889926.70	318968.22
6	889291.43	318969.20
7	888761.24	319161.51
8	888761.24	319376.75
9	889697.43	319633.42
10	889958.93	319632.81
11	889958.93	318956.62
12	888696.72	318956.62

Groundwater monitoring will consist of collection and analysis of groundwater samples from 12 monitoring wells on a quarterly basis for the first year. After the first year, the monitoring frequency, analytical parameters, and wells in the program may change based on the results of the previous sampling efforts and agreements made by the Navy and MDEQ. Initially, samples will be analyzed for VOCs, iron, manganese, and thallium. Well locations were selected to monitor the groundwater along the downgradient side of the landfill.

Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs to be implemented at Site 1 are as follows:

- Prohibit residential uses of the site;
- Prohibit excavation/disturbance of buried waste, and surface/subsurface soil from the site;
- Prohibit extraction of groundwater from the shallow surficial aquifer;
- Maintain the integrity of the soil cover and prevent intrusion into the cover of more than 1 foot bls.

The following generally describes those LUCs that will be implemented at Site 1 to achieve the aforementioned LUC performance objectives:

- Non-recreational use and soil cover disturbance prohibitions will be imposed via the Base Master Planning process to include incorporating a figure with geographic information system coordinates showing the boundaries of the site into the NCBC Base Master Plan;
- Signs will be posted advising that any site excavation activity must be authorized in advance by the Public Works office;
- Should any portion of the site later be leased or transferred, limits on future use of the Site consistent with the aforementioned LUC objectives will be incorporated into the controlling real estate document(s) (e.g., lease or deed).

The Navy is responsible for implementing, maintaining, reporting, and enforcing the LUCs described in this DD. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for remedy integrity.

LUC implementation actions including periodic site inspections will be specified in a Land Use Control Implementation Plan (LUCIP) that will be prepared by the Navy and provided to MDEQ. The Navy will maintain, monitor, and enforce the above identified LUCs consistent with the *Principles and Procedures for Specifying, Monitoring, and Enforcement of Land Use Controls and Other Post-ROD Actions*, per letter dated October 2, 2003, from Raymond F. DuBois, Deputy Under Secretary of Defense (Installations and Environment), to Hon. Marianne Lamont Horinko, Acting Administrator, USEPA.

Exit strategy for Site 1 soils: Unless the buried waste is removed, there are no foreseeable exit strategies for the above identified soil related LUCs and soil cover maintenance requirements. Therefore, those remedy components will be implemented and maintained by the Navy in perpetuity unless or until the site is otherwise rendered capable of allowing unrestricted use/unrestricted exposure.

Exit strategy for Site 1 groundwater: Monitoring to assess the potential leaching of contaminants from the buried waste will continue through the 5-year review. This program may be altered at any time to reduce sampling frequency, the wells being sampled or the analytical parameters. At the 5-year review and subsequent 5-year reviews, the monitoring program will be evaluated and altered as deemed appropriate.

2.12.3 Expected Outcomes of Selected Remedy

Current planned use for training exercises, which will be supported by the selected remedy, is expected to continue at Site 1. Groundwater at the site is not currently used and is not expected to be used in the future. There are no socio-economic, community revitalization, or economic impacts or benefits associated with implementation of the selected remedy. It is estimated that the RAOs for Site 1 will be achieved upon implementation of the remedy. Table 2-6 describes how the selected remedy mitigates risk and achieves RAOs for Site 1.

TABLE 2-6. HOW SELECTED REMEDY MITIGATES RISK AND ACHIEVES RAOS		
RISK	RAO	COMMENTS
Direct exposure to and ingestion of contaminated soil and buried waste	Prevent direct contact with the landfilled waste and soil affected by the landfill, thereby precluding potential unacceptable human exposure(s) to those media.	The existing landfill cover will provide a barrier to direct contact with the landfill contents. LUCs will prevent disturbance of the soil/vegetative cover and unsuitable use of the site.
Direct exposure and ingestion of the dieldrin contaminated surface soil	Prevent human and ecological receptor exposure to dieldrin in surface soil.	Removal and disposal of the contaminated surface soil will eliminate the potential contact pathway.
Direct exposure to contaminants via groundwater	Prevent direct exposure routes for human receptors to groundwater that has been in contact with buried waste.	LUCs will prevent accessing and use of the shallow groundwater at the site. Routine monitoring will ensure attenuation is occurring and uncontrolled migration of contaminants is not occurring.

Because the reasonably anticipated use of the site for training exercises is expected to continue for the foreseeable future, it is not expected that modification or removal of the LUCs will be required; however, if proposed land use changes in the future and uses other than training-type activities are expected, additional remedial actions would be required. Any modifications to LUCs will be conducted in accordance with provisions to be contained in the Site 1 LUCIP.

2.13 STATUTORY DETERMINATIONS

In accordance with Section 121 of CERCLA and the NCP, the Presumptive Remedy meets the following statutory determinations:

- **Protection of Human Health and the Environment** – The Presumptive Remedy is needed to prevent estimated risks associated with hypothetical future residential exposure and to minimize future ecological exposure to contaminated soil. Containment of soil and buried waste will achieve the RAOs, and LUCs will be implemented to ensure protectiveness.

- **Compliance with ARARs** – The selected remedy will attain identified federal and state ARARs, as presented in Appendix C.

- **Cost-Effectiveness** – The selected remedy is a cost-effective alternative that allows for continued use of the property for training exercises and represents reasonable value for the money. The costs are proportional to overall effectiveness by achieving an adequate amount of long-term effectiveness and permanence within a reasonable period. Detailed costs for the selected remedy are presented in Appendix A.

- **Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable** – The selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practical manner at Site 1. Based on the type and volume of contamination and the current and reasonably anticipated future use of the site, no waste treatment alternatives were evaluated for Site 1 in the FS. Containment to prevent exposure to site contaminants provides the best balance of tradeoffs for long-term effectiveness and permanence with ease of implementation for reasonable cost.

- **Preference for Treatment as a Principal Element** – Treatment is not a principal element of the selected remedy for soil or groundwater at Site 1 because there are no principal threat wastes at the site and containment provides the best balance of tradeoffs with respect to long-term effectiveness and permanence at a reasonable cost.

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

2.14 Documentation of Significant Changes

CERCLA Section 117(b) requires that an explanation be provided for any significant change(s) to the preferred remedy presented in the Proposed Plan that was published for public comment. This Decision Document will not significantly change the preferred remedy that was presented in the Proposed Plan.

3.0 RESPONSIVENESS SUMMARY

3.1 STAKEHOLDER COMMENTS AND LEAD AGENCY RESPONSES

Participants at the public meeting held on April 17, 2014, included the general public, current RAB members, and representatives of the Navy and MDEQ. Public participation was minimal. A court reporter captured the minutes of this meeting. Questions raised at the meeting were addressed at the meeting, as summarized in Table 3-1. No additional written comments, concerns, or questions were received by the Navy or MDEQ during the public comment period.

TABLE 3-1. SUMMARY OF QUESTIONS FROM PUBLIC INFORMATION SESSION

QUESTION	RESPONSE
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.	.
.	.

3.2 TECHNICAL AND LEGAL ISSUES

No technical or legal issues associated with the Site 1 DD were identified.

APPENDIX A

COSTING

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 1 FS
Alternative 2: Focused Excavation, Maintaining Existing Soil Cover, Strom Water Drainage Pipe/Culvert Cleanout and Sediment Removal, LUCs and Groundwater Monitoring
Capital Cost

				Unit Cost			Extended Cost				
Item	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
1 PROJECT PLANNING											
1.1 Prepare Construction/Work Plans	100	hr			$38.00		$0	$0	$3,800	$0	$3,800
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2 Equipment Mobilization/Demobilization	2	ea			$170.00	$522.00	$0	$0	$340	$1,044	$1,384
3 FIELD SUPPORT											
3.1 Office Trailer	1	mo				$375.00	$0	$0	$0	$375	$375
3.2 Field Office Equipment, Utilities, & Support	1	mo		$470.00			$0	$470	$0	$0	$470
3.3 Storage Trailer	1	mo				$99.00	$0	$0	$0	$99	$99
3.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,250.00				$1,250	$0	$0	$0	$1,250
3.5 Construction Layout Survey	1	day	$1,675.00				$1,675	$0	$0	$0	$1,675
3.6 Site Superintendent	15	day		$135.00	$390.00		$0	$2,025	$5,850	$0	$7,875
3.7 Site Health & Safety and QA/QC	15	day		$135.00	$360.00		$0	$2,025	$5,400	$0	$7,425
4 DECONTAMINATION											
4.1 Decontamination Services	1	mo		$1,220.00	$2,245.00	$1,550.00	$0	$1,220	$2,245	$1,550	$5,015
4.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
4.3 Decon Water	2,000	gal		$0.20			$0	$400	$0	$0	$400
4.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$781.00	$0	$0	$0	$781	$781
4.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$706.00	$0	$0	$0	$706	$706
4.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
5 EXCAVATION AND FILL											
5.1 Dozer, 140 hp	8	day			$340.40	$682.00	$0	$0	$2,723	$5,456	$8,179
5.2 Front End Loader, 3 to 4.5 cy	0	day			$340.40	$541.00	$0	$0	$0	$0	$0
5.3 Compactor, 125 h.p. (2 each)	5	day			$340.40	$594.90	$0	$0	$1,702	$2,975	$4,677
5.4 Site Labor, (3 laborers)	8	day			$252.80		$0	$0	$2,022	$0	$2,022
5.5 Off Site Soil Disposal, Non-Hazardous	165	ton	$35.00				$5,775	$0	$0	$0	$5,775
5.6 Characterization/Offsite Disposal Soil Testing	2	ea	$1,000.00	$20.00			$2,000	$40	$0	$0	$2,040
5.7 Confirmatory Sampling, (72 hr TAT)	5	ea	$480.00	$10.00			$2,400	$50	$0	$0	$2,450
5.8 Select Fill	118	cy		$15.00			$0	$1,770	$0	$0	$1,770
5.9 Topsoil, loam (6 in)	30	cy		$22.42			$0	$673	$0	$0	$673
6 PIPE AND DITCH CLEANOUT											
6.1 Upper Layer, sand/gravel	0	cy		$8.50			$0	$0	$0	$0	$0
6.2 Dozer, 140 hp	0	day			$340.40	$682.00	$0	$0	$0	$0	$0
6.3 Compactor, 125 h.p. (2 each)	0	day			$340.40	$594.90	$0	$0	$0	$0	$0
6.4 Site Labor, (3 laborers)	3	day			$252.80		$0	$0	$758	$0	$758
6.5 Cleanout concrete pipe/culverts	1	ls	$12,000.00				$12,000	$0	$0	$0	$12,000
6.6 Cleanout drainage ditches/sediment removal	1	ls	$8,000.00				$8,000	$0	$0	$0	$8,000
7 MONITORING WELL INSTALLATION											
7.1 Well Installation (6 wells)	90	lf	$80.00				$7,200	$0	$0	$0	$7,200
7.2 Well Development	24	hr	$200.00				$4,800	$0	$0	$0	$4,800
7.3 Protective Well Casing & Apron	6	ea	$750.00				$4,500	$0	$0	$0	$4,500
7.4 Abandon Wells (10 wells)	150	lf	$12.50				$1,875	$0	$0	$0	$1,875
7.5 IDW Transport & Disposal, solid non-haz	4	drum	$195.00				$780	$0	$0	$0	$780
7.6 IDW Transport & Disposal, liquid non-haz	4	drum	$185.00				$740	$0	$0	$0	$740

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 1 FS
Alternative 2: Focused Excavation, Maintaining Existing Soil Cover, Strom Water Drainage Pipe/Culvert Cleanout and Sediment Removal, LUCs and Groundwater Monitoring
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
8 POST CONSTRUCTION COST											
8.1 Contractor Completion Report	60	hr			$38.00		$0	$0	$2,280	$0	$2,280
8.2 Remedial Action Closeout Report	80	hr			$38.00		$0	$0	$3,040	$0	$3,040
8.3 Prepare LUC Document	120	hr			$38.00		$0	$0	$4,560	$0	$4,560
8.4 LUC Survey Support	2	day	$1,675.00				$3,350	$0	$0	$0	$3,350
Subtotal							$57,295	$11,173	$36,721	$16,786	$121,974
Local Area Adjustments							100.0%	103.7%	89.6%	89.6%	
Subtotal							$57,295	$11,586	$32,902	$15,040	$116,823
Overhead on Labor Cost @ 30%									$9,871		$9,871
G & A on Labor, Material, Equipment, & Sub Cost @ 10%							$5,730	$1,159	$3,290	$1,504	$11,682
Tax on Materials and Equipment Cost @ 7%								$811		$1,053	$1,864
Total Direct Cost							$63,025	$13,556	$46,063	$17,597	$140,240
Indirects on Total Direct Cost @ 25%											$35,060
Profit on Total Direct Cost @ 10%											$14,024
Subtotal											$189,323
Health & Safety Monitoring @ 2%											$3,786
Total Field Cost											$193,110
Contingency on Total Field Costs @ 25%											$48,277
Engineering on Total Field Cost @ 5%											$9,655
TOTAL CAPITAL COST											**$251,043**

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 1 FS

Alternative 2: Focused Excavation, Maintaining Existing Soil Cover, Strom Water Drainage Pipe/Culvert Cleanout and Sediment Removal, LUCs and Groundwater Monitoring
Annual Cost

Item	Item Cost year 1	Item Cost years 2 & 3	Item Cost years 4 to 30	Item Cost every 5 years	Notes
Site Inspection & Report	$2,350	$2,350	$2,350		Labor and supplies once a year to inspect Land Use Controls with
Cover Inspection	$3,100	$3,100	$3,100		Visit to inspect cover twice a year
Cover Maintenance	$20,000	$20,000	$20,000		Cut (mow) cover 20 times a year
Cover Repair	$0	$0		$0	Cover repair in years 1, 2, 3, 5, 10,15, 20, 25, & 30
Sampling	$35,000	$17,500	$8,750		Labor and supplies to collect samples from wells using a crew of two.
Analysis/Water	$18,480	$9,240	$4,620		Analyze groundwater samples from 12 wells for VOCs and metals in years 1 through 30. Collect samples 4 times a year in year 1, twice a year in years 2 & 3, and once a year for years 4 through 30.
Report	$6,000	$3,000	$1,500		Document sampling & results
Five Year Site Review				$15,000	Labor and supplies to evaluate site every five years for 5-year review
Subtotal	$84,930	$55,190	$40,320	$15,000	
Contingency @ 10%	$8,493	$5,519	$4,032	$1,500	
TOTAL	$93,423	$60,709	$44,352	$16,500	

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 1 FS

Alternative 2: Focused Excavation, Maintaining Existing Soil Cover, Strom Water Drainage Pipe/Culvert Cleanout and Sediment Removal, LUCs and Groundwater Monitoring
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$251,043		$251,043	1.000	$251,043
1		$93,423	$93,423	0.935	$87,351
2		$60,709	$60,709	0.873	$52,999
3		$60,709	$60,709	0.816	$49,539
4		$44,352	$44,352	0.763	$33,841
5		$60,852	$60,852	0.713	$43,387
6		$44,352	$44,352	0.666	$29,538
7		$44,352	$44,352	0.623	$27,631
8		$44,352	$44,352	0.582	$25,813
9		$44,352	$44,352	0.544	$24,127
10		$60,852	$60,852	0.508	$30,913
11		$44,352	$44,352	0.475	$21,067
12		$44,352	$44,352	0.444	$19,692
13		$44,352	$44,352	0.415	$18,406
14		$44,352	$44,352	0.388	$17,209
15		$60,852	$60,852	0.362	$22,028
16		$44,352	$44,352	0.339	$15,035
17		$44,352	$44,352	0.317	$14,060
18		$44,352	$44,352	0.296	$13,128
19		$44,352	$44,352	0.277	$12,286
20		$60,852	$60,852	0.258	$15,700
21		$44,352	$44,352	0.242	$10,733
22		$44,352	$44,352	0.226	$10,024
23		$44,352	$44,352	0.211	$9,358
24		$44,352	$44,352	0.197	$8,737
25		$60,852	$60,852	0.184	$11,197
26		$44,352	$44,352	0.172	$7,629
27		$44,352	$44,352	0.161	$7,141
28		$44,352	$44,352	0.15	$6,653
29		$44,352	$44,352	0.141	$6,254
30		$60,852	$60,852	0.131	$7,972
				TOTAL PRESENT WORTH	**$910,489**

APPENDIX B

TABLES FROM REMEDIAL INVESTIGATION REPORT

TABLE 6-13
EXPOSURE POINT CONCENTRATIONS
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Surface Soil (mg/kg)	Subsurface Soil (mg/kg)	Groundwater (ug/L)	Surface Water (ug/L)	Sediment (mg/kg)
Volatile Organic Compounds					
TETRACHLOROETHENE	NA	NA	0.54[(1)(2)]	NA	NA
TRICHLOROETHENE	NA	NA	0.32[(3)]	NA	NA
Semivolatile Organic Compounds					
NAPHTHALENE	NA	NA	6.7[(1)]	NA	NA
BENZO(A)PYRENE EQUIVALENTS	NA	NA	NA	NA	0.2[(1)]
Pesticides/PCBs					
AROCLOR-1242	NA	2.4[(1)]	NA	NA	NA
DIELDRIN	0.3	NA	NA	NA	NA
Inorganics	NA	NA	NA	NA	NA
ALUMINUM	7780	9700[(1)]	6320[(1)]	NA	17200[(1)]
ANTIMONY	1	NA	NA	NA	NA
ARSENIC	2.2	2[(1)]	19.1[(1)]	3.4[(1)]	19.8[(1)]
COBALT	2.2	NA	NA	NA	NA
IRON	4330	NA	44000[(1)]	2410[(1)]	28100[(1)]
MANGANESE	55.4	NA	548[(1)]	NA	295[(1)]
THALLIUM	NA	NA	4.1[(1)]	NA	NA

Notes:
The exposure point concentrations (EPCs) were calculated according to USEPA's ProUCL guidance. See the RAGS PART D Table 3s in Appendix D for details concerning the EPCs.
NA - Not applicable. Not a COPC for this media.

1 - Maximum Detected Concentration
2 - Tetrachloroethene was selected as a COPC in direct push technology (DPT) groundwater samples only.
3 - Trichloroethene was selected as a COPC in both DPT and monitoring well samples for the vapor intrusion pathway. The maximum concentration of the two groundwater data sets was used as the EPC.

µg/L = micrograms per liter
mg/kg = milligrams per kilogram

TABLE 6-14
SUMMARY OF EXPOSURE FACTORS - REASONABLE MAXIMUM EXPOSURE
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Exposure Route	Construction/ Excavation Worker	Site Maintenance Worker	Site Industrial Worker	Adolescent Trespasser	Adult Trespasser	Future Child Resident	Future Adult Resident
ASSUMPTIONS FOR EXPOSURE TO SOIL AND SEDIMENT							
Exposure Concentration - C_{soil}, C_{sed} (mg/kg)	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
Ingestion Rate (IR) (mg/day)	330[2]	100[1]	50[1]	100[1]	50[1]	200[1]	100[1]
Fraction Ingested (FI) (unitless)	1.0[3]	1.0[3]	1.0[3]	1.0[3]	1.0[3]	1.0[3]	1.0[3]
Skin Surface Area (SA) (cm^2/day)	3,300[4]	3,300[4]	3,300[4]	3,250[5]	5,700[4]	2,800[4]	5,700[4]
Soil-to-Skin Adherence Factor (AF) (mg/cm^2)	0.3[4]	0.2[4]	0.2[4]	0.4[4]	0.07[4]	0.2[4]	0.07[4]
Absorption Factor (ABS) (unitless)	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]
Conversion Factor (CF) (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Exposure Frequency (EF) - Soil (days/year)	250[6]	24[7]	250[1]	30[8]	30[8]	350[1]	350[1]
Exposure Frequency (EF) - Sediment (days/year)	30[6]	24[7]	24[7]	30[8]	30[8]	30[8]	30[8]
Exposure Duration (ED) (years)	1[6]	25[1]	25[1]	11[9]	19[9]	6[1]	24[1]
Body Weight (BW) (kg)	70[2]	70[2]	70[2]	45[10]	70[2]	15[1]	70[2]
Noncarcinogenic Averaging Time (AT_n) (days)	365[3]	9,125[3]	9,125[3]	4,015[3]	6,935[3]	2,190[3]	8,760[3]
Carcinogenic Averaging Time (AT_c) (days)	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]
ASSUMPTIONS FOR EXPOSURE TO SURFACE WATER							
Exposure Concentration - C_{sw}	Maximum[11]	Maximum[11]	Maximum[11]	Maximum[11]	Maximum[11]	Maximum[11]	Maximum[11]
Ingestion Rate (IR) (L/hour)	0.01[10]	0.01[10]	0.01[10]	0.01[10]	0.01[10]	0.05[10]	0.01[10]
SA (cm^2/day)	3,300[4]	3,300[4]	3,300[4]	3,250[5]	5,700[4]	2,800[4]	5,700[4]
EV (events/day)	1[6]	1[7]	1[6]	1[6]	1[6]	1[6]	1[6]
ET (hours/day) and t_{event} (hours/event)	1[6]	1[7]	1[6]	1[6]	1[6]	1[6]	1[6]
EF (days/year)	30[6]	24[7]	30[6]	30[8]	30[8]	30[8]	30[8]
K_p (cm/hour)	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]
t* (hour/event), τ (hour), and B (unitless)	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]
Exposure Duration (ED) (years)	1[6]	25[1]	25[1]	11[9]	19[9]	6[1]	24[1]
BW (kg)	70[2]	70[2]	70[2]	45[10]	70[2]	15[1]	70[2]
AT_n (days)	365[3]	9,125[3]	9,125[3]	4,015[3]	6,935[3]	2,190[3]	8,760[3]
AT_c (days)	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]

TABLE 6-14
SUMMARY OF EXPOSURE FACTORS - REASONABLE MAXIMUM EXPOSURE
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Exposure Route	Construction/ Excavation Worker	Site Maintenance Worker	Site Industrial Worker	Adolescent Trespasser	Adult Trespasser	Future Child Resident	Future Adult Resident
ASSUMPTIONS FOR EXPOSURE TO GROUNDWATER							
Exposure Concentration - C_{gw}	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]
Ingestion Rate (IR) (L/day)	NA	NA	NA	NA	NA	1.5[12]	2[1]
Skin Surface Area (SA) (cm^2/day)	3,300[4]	NA	NA	NA	NA	6,600[4]	18,000[4]
Exposure Time (ET) (hour/event)	4[6]	NA	NA	NA	NA	0.33[6]	0.33[6]
Event Frequency (EV) (events/day)	1[6]	NA	NA	NA	NA	1[6]	1[6]
Permeability Coefficient from Water through Skin (K_p)(cm/hour)	chemical-specific[4]	NA	NA	NA	NA	chemical-specific[4]	chemical-specific[4]
Bunge Dermal Model variables - t* (hour/event), T (hour), and B (unitless)	chemical-specific[4]	NA	NA	NA	NA	chemical-specific[4]	chemical-specific[4]
Conversion Factor (CF) (L/cm^3)	1E-03	NA	NA	NA	NA	1E-03	1E-03
Exposure Frequency (EF) (days/year)	30[6]	NA	NA	NA	NA	350[1]	350[1]
Exposure Duration (ED) (years)	1[6]	NA	NA	NA	NA	6[1]	24[1]
Body Weight (BW) (kg)	70[2]	NA	NA	NA	NA	15[1]	70[2]
Noncarcinogenic Averaging Time (AT_n) (days)	365[3]	NA	NA	NA	NA	2,190[3]	8,760[3]
Carcinogenic Averaging Time (AT_c) (days)	25,550[3]	NA	NA	NA	NA	25,550[3]	25,550[3]
ASSUMPTIONS FOR EXPOSURE VIA INHALATION OF VOCS FROM GROUNDWATER							
Exposure Time (hours/day)	4[6]	NA	NA	NA	NA	NA	NA

Footnotes:

1 - USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
3 - USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
4 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
5 - Assumed 25 percent of total body surface area is exposed.
6 - Professional judgment. Assumes a one year construction project. Construction workers are assumed to be exposed to soil during the entire project. Exposure to groundwater, surface water, and sediment are assumed to occur for only 30 days a year.
7 - Assumes receptor is exposed to surface water and sediment 2 days per month.
8 - Assumes wading 2 to 3 days per week during summer months.
9 - Assumes a total 30 year exposure, 11 years for an adolescent (6 to 16 years old) and the remaining 19 years for an adult.
10 - USEPA Region 4: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. May 2000. See text.
11 - Less than ten samples were collected; therefore, the maximum detected concentration was used as the exposure point concentration.
12 - USEPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.

TABLE 6-15
SUMMARY OF EXPOSURE FACTORS - CENTRAL TENDENCY EXPOSURE
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Exposure Route	Construction/ Excavation Worker	Site Maintenance Worker	Site Industrial Worker	Adolescent Trespasser	Adult Trespasser	Future Child Resident	Future Adult Resident
ASSUMPTIONS FOR EXPOSURE TO SOIL AND SEDIMENT							
Exposure Concentration - C_{soil}, C_{sed} (mg/kg)	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
Ingestion Rate (IR) (mg/day)	165[6]	50[1]	50[1]	50[1]	50[1]	100[1]	50[1]
Fraction Ingested (FI) (unitless)	1.0[3]	1.0[3]	1.0[3]	1.0[3]	1.0[3]	1.0[3]	1.0[3]
Skin Surface Area (SA) (cm^2/day)	3,300[4]	3,300[4]	3,300[4]	3,250[5]	5,700[4]	2,800[4]	5,700[4]
Soil-to-Skin Adherence Factor (AF) (mg/cm^2)	0.1[4]	0.02[4]	0.02[4]	0.04[4]	0.01[4]	0.04[4]	0.01[4]
Absorption Factor (ABS) (unitless)	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]
Conversion Factor (CF) (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Exposure Frequency (EF) - Soil (days/year)	125[6]	12[7]	219[1]	15[6]	15[6]	234[1]	234[1]
Exposure Frequency (EF) - Sediment (days/year)	15[6]	12[7]	12[7]	15[6]	15[6]	15[6]	15[6]
Exposure Duration (ED) (years)	1[6]	9[1]	9[1]	11[8]	19[8]	2[1]	7[1]
Body Weight (BW) (kg)	70[1]	70[1]	70[1]	45[9]	70[1]	15[1]	70[1]
Noncarcinogenic Averaging Time (AT_n) (days)	365[3]	9,125[3]	9,125[3]	4,015[3]	6,935[3]	730[3]	2,555[3]
Carcinogenic Averaging Time (AT_c) (days)	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]
ASSUMPTIONS FOR EXPOSURE TO SURFACE WATER							
Exposure Concentration - C_{sw}	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]	Maximum[10]
Ingestion Rate (IR) (L/hour)	0.01[9]	0.01[9]	0.01[9]	0.01[9]	0.01[9]	0.05[9]	0.01[9]
SA (cm^2/day)	3,300[4]	3,300[4]	3,300[4]	3,250[5]	5,700[4]	2,800[4]	5,700[4]
EV (events/day)	1[6]	1[6]	1[6]	1[6]	1[6]	1[6]	1[6]
ET (hours/day) and t_{event} (hours/event)	1[6]	1[6]	1[6]	1[6]	1[6]	1[6]	1[6]
EF (days/year)	15[6]	12[7]	12[7]	15[6]	15[6]	15[6]	15[6]
K_p (cm/hour)	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]
t* (hour/event), τ (hour), and B (unitless)	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]	chemical-specific[4]
Exposure Duration (ED) (years)	1[6]	9[1]	9[1]	11[6]	19[6]	2[1]	7[1]
BW (kg)	70[1]	70[1]	70[1]	45[9]	70[1]	15[1]	70[1]
AT_n (days)	365[3]	9,125[3]	9,125[3]	4,015[3]	6,935[3]	730[3]	2,555[3]
AT_c (days)	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]

TABLE 6-15
SUMMARY OF EXPOSURE FACTORS - CENTRAL TENDENCY EXPOSURE
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

ASSUMPTIONS FOR EXPOSURE TO GROUNDWATER							
Exposure Concentration - C_{gw}	Average[9]	Average[9]	Average[9]	Average[9]	Average[9]	Average[9]	Average[9]
Ingestion Rate (IR) (L/day)	NA	NA	NA	NA	NA	0.66[11]	1.4[1]
Skin Surface Area (SA) (cm^2/day)	3,300[4]	NA	NA	NA	NA	6,600[4]	18,000[4]
Exposure Time (ET) (hour/event)	2[6]	NA	NA	NA	NA	0.25[6]	0.25[6]
Event Frequency (EV) (events/day)	1[6]	NA	NA	NA	NA	1[6]	1[6]
Permeability Coefficient from Water through Skin (K_p)(cm/hour)	chemical-specific[4]	NA	NA	NA	NA	chemical-specific[4]	chemical-specific[4]
Bunge Dermal Model variables - t* (hour/event), T (hour), and B (unitless)	chemical-specific[4]	NA	NA	NA	NA	chemical-specific[4]	chemical-specific[4]
Conversion Factor (CF) (L/cm^3)	1E-03	1E-03	NA	NA	NA	1E-03	1E-03
Exposure Frequency (EF) (days/year)	15[6]	NA	NA	NA	NA	234[1]	234[1]
Exposure Duration (ED) (years)	1[6]	NA	NA	NA	NA	2[1]	7[1]
Body Weight (BW) (kg)	70[1]	NA	NA	NA	NA	15[1]	70[1]
Noncarcinogenic Averaging Time (AT_n) (days)	365[3]	NA	NA	NA	NA	730[3]	2,555[3]
Carcinogenic Averaging Time (AT_c) (days)	25,550[3]	NA	NA	NA	NA	25,550[3]	25,550[3]
ASSUMPTIONS FOR EXPOSURE VIA INHALATION OF VOCS FROM GROUNDWATER							
Exposure Time (hours/day)	2[6]	NA	NA	NA	NA	NA	NA

Footnotes:
1 - USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
3 - USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
4 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
5 - Assumed 25 percent of total body surface area is exposed.
6 Professional Judgment. Assumes one half the RME exposure.
7 - Assumes receptor is exposed to surface water and sediment one day per month.
8 Assumes a total 30 year exposure, 11 years for an adolescent (6 to 16 years old) and the remaining 19 years for an adult.
9 - USEPA Region 4: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. May 2000.
10 - Less than ten samples were collected therefore the maximum detected concentration was used as the exposure point concentration.
11 - USEPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.

TABLE 6-16
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds										
TETRACHLOROETHENE	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Liver	1000/1	IRIS	4/30/2009
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body Weight	3000/1	IRIS	4/30/2009
BENZO(A)PYRENE EQUIVALENTS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs										
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIELDRIN	Chronic	5.0E-05	mg/kg/day	1	5.0E-05	mg/kg/day	Liver	100/1	IRIS	4/30/2009
Inorganics										
ALUMINUM	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	CNS	100	PPRTV	10/23/2006
ANTIMONY	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	4/30/2009
ARSENIC	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	4/30/2009
COBALT	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	NA	NA	ORNL	04/2009
IRON	Chronic	7.0E-01	mg/kg/day	1	7.0E-01	mg/kg/day	GS	1.5	PPRTV	9/11/2006
MANGANESE (soil)[3]	Chronic	7.0E-02	mg/kg/day	0.04	2.8E-03	mg/kg/day	CNS	1/1	IRIS	4/30/2009
MANGANESE (water)[3]	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	CNS	1/3	IRIS	4/30/2009
THALLIUM	Chronic	6.5E-05	mg/kg/day	1	6.5E-05	mg/kg/day	Hair Loss, Liver	3000/1	ORNL	04/2009

Notes:
1 - U.S. EPA, 2004. Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.
3 - Adjusted IRIS value in accordance with USEPA Region I Risk Update Number 4, November 1996.

Definitions:
CNS = Central Nervous System
CVS = Cardiovascular system
GS = Gastrointestinal

IRIS = Integrated Risk Information System
NA = Not Available
ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April 2009
PPRTV = Provisional Peer Reviewed Toxicity Values

TABLE 6-17
NON-CANCER TOXICITY DATA -- INHALATION
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds									
TETRACHLOROETHENE	Chronic	2.7E-01	mg/m^3	7.7E-02	(mg/kg/day)	Liver	NA	ORNL	04/2009
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds									
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	Chronic	3.0E-03	mg/m^3	8.6E-04	(mg/kg/day)	Respiratory	3000/1	IRIS	4/30/2009
BENZO(A)PYRENE EQUIVALENTS	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs									
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIELDRIN	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics									
ALUMINUM	Chronic	5.0E-03	mg/m^3	1.4E-03	(mg/kg/day)	CNS	300	PPRTV	10/23/2006
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	Chronic	3.00E-05	mg/m^3	8.6E-06	(mg/kg/day)	NA	NA	ORNL	04/2009
COBALT	Chronic	6.0E-06	mg/m^3	1.7E-06	(mg/kg/day)	Respiratory	NA	ORNL	04/2009
IRON	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	Chronic	5.0E-05	mg/m^3	1.4E-05	(mg/kg/day)	CNS	1000/1	IRIS	4/30/2009
THALLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg

Definitions:

CNS = Central Nervous System

IRIS = Integrated Risk Information System

NA = Not Applicable

ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April 2009.

PPRTV = Provisional Peer Reviewed Toxicity Values

TABLE 6-18
CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds								
TETRACHLOROETHENE	5.4E-01	$(mg/kg/day)^{-1}$	1	5.4E-01	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
TRICHLOROETHENE	1.3E-02	$(mg/kg/day)^{-1}$	1	1.3E-02	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
Semivolatile Organic Compounds								
BENZO(A)PYRENE[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	4/30/2009
BENZO(B)FLUORANTHENE[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
NAPHTHALENE	NA	NA	NA	NA	NA	C / Possible human carcinogen	IRIS	4/30/2009
BENZO(A)PYRENE EQUIVALENTS[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	4/30/2009
Pesticides/PCBs								
AROCLOR-1242	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(2)	9/1996
DIELDRIN	1.6E+01	$(mg/kg/day)^{-1}$	1	1.6E+01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	4/30/2009
Inorganics								
ALUMINUM	NA	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A / Known/likely human carcinogen	IRIS	4/30/2009
COBALT	NA	NA	NA	NA	NA	NA	NA	NA
IRON	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	4/30/2009
THALLIUM	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	4/30/2009

Notes:

1 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.

2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor / Oral Absorption Efficiency for Dermal.

3 - The carcinogenic PAHs are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Definitions:

IRIS = Integrated Risk Information System.

NA = Not Available.

ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April, 2009.

PPRTV = Provisional Peer Reviewed Toxicity Values

USEPA(1) = USEPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

USEPA(2) = USEPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996, EPA/600/P-96/001F.

TABLE 6-19
CANCER TOXICITY DATA -- INHALATION
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds							
TETRACHLOROETHENE	5.9E-06	$(ug/m^3)^{-1}$	2.1E-02	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
TRICHLOROETHENE	2.0E-06	$(ug/m^3)^{-1}$	7.0E-03	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
Semivolatile Organic Compounds							
BENZO(A)PYRENE[2]	1.1E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
BENZO(B)FLUORANTHENE[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
NAPHTHALENE	3.4E-05	$(ug/m^3)^{-1}$	1.2E-01	$(mg/kg/day)^{-1}$	C/ Possible Human Carcinogen	ORNL	04/2009
BENZO(A)PYRENE EQUIVALENTS[2]	1.1E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
Pesticides/PCBs							
AROCLOR-1242	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(2)	9/1996
DIELDRIN	4.6E-03	$(ug/m^3)^{-1}$	1.6E+01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	4/30/2009
Inorganics							
ALUMINUM	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	NA	NA	NA	NA	NA	NA	NA
ARSENIC	4.3E-03	$(ug/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	4/30/2009
COBALT	9.0E-03	$(ug/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	NA	ORNL	04/2009
IRON	NA	NA	NA	NA	NA	NA	NA
MANGANESE	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	4/30/2009
THALLIUM	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	4/30/2009

Notes:

1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.

2 - The carcinogenic PAHs are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

3 - Values are for chlordane.

4 - Values are for alpha-BHC.

Definitions:

IRIS = Integrated Risk Information System.

NA = Not Available.

ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April 2009.

USEPA(2) = USEPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996, EPA/600/P-96/001F.

TABLE 6-20
SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-6}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Construction Workers	Surface Soil	Incidental Ingestion	4E-07	--	--	--	1E-01	--
		Dermal Contact	8E-08	--	--	--	8E-03	--
		Total	5E-07	--	--	--	1E-01	--
	Subsurface Soil	Incidental Ingestion	4E-07	--	--	--	5E-02	--
		Dermal Contact	1E-07	--	--	--	2E-03	--
		Total	5E-07	--	--	--	5E-02	--
	Groundwater - MW	Incidental Ingestion	0E+00	--	--	--	0E+00	--
		Dermal Contact	6E-09	--	--	--	1E-02	--
		Inhalation	1E-09	--	--	--	9E-04	--
		Total	8E-09	--	--	--	1E-02	--
	Groundwater - DPT	Incidental Ingestion	0E+00	--	--	--	0E+00	--
		Dermal Contact	3E-09	--	--	--	4E-05	--
		Inhalation	2E-11	--	--	--	8E-07	--
		Total	3E-09	--	--	--	4E-05	--
	Surface Water	Incidental Ingestion	9E-10	--	--	--	2E-04	--
		Dermal Contact	3E-10	--	--	--	6E-05	--
		Total	1E-09	--	--	--	2E-04	--
	Sediment	Incidental Ingestion	2E-07	--	--	--	5E-02	--
		Dermal Contact	2E-08	--	--	--	2E-03	--
		Total	2E-07	--	--	--	5E-02	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		7E-07				2E-01	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		7E-07				1E-01	
	Total Surface Soil, DPT Groundwater, Surface Water, and Sediment		6E-07				2E-01	
	Total Subsurface Soil, DPT Groundwater, Surface Water, and Sediment		7E-07				1E-01	
Site Maintenance Worker	Surface Soil	Incidental Ingestion	3E-07	--	--	--	4E-03	--
		Dermal Contact	1E-07	--	--	--	5E-04	--
		Total	4E-07	--	--	--	4E-03	--
	Subsurface Soil	Incidental Ingestion	3E-07	--	--	--	2E-03	--
		Dermal Contact	2E-07	--	--	--	1E-04	--
		Total	4E-07	--	--	--	2E-03	--
	Surface Water	Incidental Ingestion	2E-08	--	--	--	1E-04	--
		Dermal Contact	6E-09	--	--	--	5E-05	--
		Total	2E-08	--	--	--	2E-04	--
	Sediment	Incidental Ingestion	1E-06	--	--	--	1E-02	--
		Dermal Contact	2E-07	--	--	--	1E-03	--
		Total	1E-06	--	--	--	1E-02	--
	Total Surface Soil, Surface Water, and Sediment		2E-06				2E-02	
	Total Subsurface Soil, Surface Water, and Sediment		2E-06				2E-02	
Site Industrial Worker	Surface Soil	Incidental Ingestion	1E-06	--	--	--	2E-02	--
		Dermal Contact	1E-06	--	--	--	5E-03	--
		Total	3E-06	--	--	Dieldrin	2E-02	--
	Subsurface Soil	Incidental Ingestion	1E-06	--	--	--	8E-03	--
		Dermal Contact	2E-06	--	--	Aroclor-1242	1E-03	--
		Total	3E-06	--	--	Aroclor-1242	9E-03	--
	Surface Water	Incidental Ingestion	2E-08	--	--	--	2E-04	--
		Dermal Contact	7E-09	--	--	--	6E-05	--
		Total	3E-08	--	--	--	2E-04	--
	Sediment	Incidental Ingestion	5E-07	--	--	--	6E-03	--
		Dermal Contact	2E-07	--	--	--	1E-03	--
		Total	8E-07	--	--	--	7E-03	--
	Total Surface Soil, Surface Water, and Sediment		4E-06				3E-02	
	Total Subsurface Soil, Surface Water, and Sediment		4E-06				2E-02	

TABLE 6-20
SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-6}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Adolescent Trespasser	Surface Soil	Incidental Ingestion	2E-07	--	--	--	7E-03	--
		Dermal Contact	2E-07	--	--	--	2E-03	--
		Total	4E-07	--	--	--	9E-03	--
	Subsurface Soil	Incidental Ingestion	2E-07	--	--	--	3E-03	--
		Dermal Contact	3E-07	--	--	--	5E-04	--
		Total	5E-07	--	--	--	3E-03	--
	Surface Water	Incidental Ingestion	1E-08	--	--	--	3E-04	--
		Dermal Contact	5E-09	--	--	--	9E-05	--
		Total	2E-08	--	--	--	4E-04	--
	Sediment	Incidental Ingestion	1E-06	--	--	--	2E-02	--
		Dermal Contact	5E-07	--	--	--	5E-03	--
		Total	2E-06	--	--	Arsenic	3E-02	--
	Total Surface Soil, Surface Water, and Sediment		2E-06				4E-02	
	Total Subsurface Soil, Surface Water, and Sediment		2E-06				3E-02	
Adult Trespasser	Surface Soil	Incidental Ingestion	1E-07	--	--	--	2E-03	--
		Dermal Contact	1E-07	--	--	--	6E-04	--
		Total	2E-07	--	--	--	3E-03	--
	Subsurface Soil	Incidental Ingestion	1E-07	--	--	--	1E-03	--
		Dermal Contact	2E-07	--	--	--	1E-04	--
		Total	3E-07	--	--	--	1E-03	--
	Surface Water	Incidental Ingestion	2E-08	--	--	--	2E-04	--
		Dermal Contact	9E-09	--	--	--	1E-04	--
		Total	3E-08	--	--	--	3E-04	--
	Sediment	Incidental Ingestion	5E-07	--	--	--	7E-03	--
		Dermal Contact	2E-07	--	--	--	9E-04	--
		Total	7E-07	--	--	--	8E-03	--
	Total Surface Soil, Surface Water, and Sediment		1E-06				1E-02	
	Total Subsurface Soil, Surface Water, and Sediment		1E-06				1E-02	

TABLE 6-20
SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-6}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Future Child Resident	Surface Soil	Incidental Ingestion	9E-06	--	--	Dieldrin, Arsenic	5E-01	--
		Dermal Contact	2E-06	--	--	Dieldrin	3E-02	--
		Total	1E-05	--	--	Dieldrin, Arsenic	5E-01	--
	Subsurface Soil	Incidental Ingestion	9E-06	--	--	Aroclor-1242, Arsenic	2E-01	--
		Dermal Contact	2E-06	--	--	Aroclor-1242	7E-03	--
		Total	1E-05	--	--	Aroclor-1242, Arsenic	2E-01	--
	Groundwater - MW	Incidental Ingestion	2E-04	Arsenic	--	--	2E+01	Arsenic, Iron, Manganese, Thallium
		Dermal Contact	3E-07	--	--	--	1E-01	--
		Inhalation	0E+00	--	--	--	3E-02	--
		Total	2E-04	Arsenic	--	--	2E+01	Arsenic, Iron, Manganese, Thallium
	Groundwater - DPT	Incidental Ingestion	2E-06	--	--	Tetrachloroethene	5E-03	--
		Dermal Contact	5E-07	--	--	--	1E-03	--
		Inhalation	2E-06	--	--	Tetrachloroethene	5E-03	--
		Total	5E-06	--	--	Tetrachloroethene	1E-02	--
	Surface Water	Incidental Ingestion	1E-07	--	--	--	4E-03	--
		Dermal Contact	7E-09	--	--	--	2E-04	--
		Total	1E-07	--	--	--	4E-03	--
	Sediment	Incidental Ingestion	4E-06	--	--	Arsenic	1E-01	--
		Dermal Contact	5E-07	--	--	--	6E-03	--
		Total	4E-06	--	--	Arsenic	1E-01	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		3E-04				2E+01	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		3E-04				2E+01	
	Total Surface Soil, DPT Groundwater, Surface Water, and Sediment		2E-05				7E-01	
	Total Subsurface Soil, DPT Groundwater, Surface Water, and Sediment		2E-05				4E-01	
Future Adult Resident	Surface Soil	Incidental Ingestion	4E-06	--	--	Dieldrin, Arsenic	5E-02	--
		Dermal Contact	1E-06	--	--	--	4E-03	--
		Total	5E-06	--	--	Dieldrin, Arsenic	6E-02	--
	Subsurface Soil	Incidental Ingestion	4E-06	--	--	Aroclor-1242	2E-02	--
		Dermal Contact	1E-06	--	--	--	1E-03	--
		Total	5E-06	--	--	Aroclor-1242, Arsenic	2E-02	--
	Groundwater - MW	Incidental Ingestion	3E-04	Arsenic	--	--	6E+00	Arsenic, Iron, Thallium
		Dermal Contact	8E-07	--	--	--	7E-02	--
		Inhalation	0E+00	--	--	--	9E-03	--
		Total	3E-04	Arsenic	--	--	6E+00	Arsenic, Iron, Thallium
	Groundwater - DPT	Incidental Ingestion	3E-06	--	--	Tetrachloroethene	1E-03	--
		Dermal Contact	1E-06	--	--	--	7E-04	--
		Inhalation	3E-06	--	--	Tetrachloroethene	1E-03	--
		Total	7E-06	--	--	Tetrachloroethene	4E-03	--
	Surface Water	Ingestion	2E-08	--	--	--	2E-04	--
		Dermal Contact	1E-08	--	--	--	1E-04	--
		Total	3E-08	--	--	--	3E-04	--
	Sediment	Incidental Ingestion	1E-06	--	--	--	1E-02	--
		Dermal Contact	2E-07	--	--	--	9E-04	--
		Total	2E-06	--	--	--	2E-02	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		3E-04				6E+00	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		3E-04				6E+00	
	Total Surface Soil, DPT Groundwater, Surface Water, and Sediment		1E-05				8E-02	
	Total Subsurface Soil, DPT Groundwater, Surface Water, and Sediment		1E-05				4E-02	

TABLE 6-20
SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Hypothetical Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	1E-05	--	--	Dieldrin, Arsenic	NA	--
		Dermal Contact	3E-06	--	--	Dieldrin	NA	--
		Total	2E-05	--	--	Dieldrin, Arsenic	NA	--
	Subsurface Soil	Incidental Ingestion	1E-05	--	--	Aroclor-1242, Arsenic	NA	--
		Dermal Contact	4E-06	--	--	Aroclor-1242	NA	--
		Total	2E-05	--	--	Aroclor-1242, Arsenic	NA	--
	Groundwater - MW	Incidental Ingestion	5E-04	Arsenic	--	--	NA	--
		Dermal Contact	1E-06	--	--	--	NA	--
		Inhalation	0E+00	--	--	--	NA	--
		Total	5E-04	Arsenic	--	--	NA	--
	Groundwater - DPT	Incidental Ingestion	5E-06	--	--	Tetrachloroethene	NA	--
		Dermal Contact	2E-06	--	--	--	NA	--
		Inhalation	5E-06	--	--	Tetrachloroethene	NA	--
		Total	1E-05	--	--	Tetrachloroethene	NA	--
	Surface Water	Incidental Ingestion	1E-07	--	--	--	NA	--
		Dermal Contact	2E-08	--	--	--	NA	--
		Total	2E-07	--	--	--	NA	--
	Sediment	Incidental Ingestion	5E-06	--	--	Arsenic	NA	--
		Dermal Contact	7E-07	--	--	--	NA	--
		Total	6E-06	--	--	Arsenic	NA	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		5E-04				NA	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		5E-04				NA	

TABLE 6-21
SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 1
NCBC GULFPORT
GULPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Construction Workers	Surface Soil	Incidental Ingestion	9E-08	--	--	--	3E-02	--
		Dermal Contact	1E-08	--	--	--	1E-03	--
		Total	1E-07	--	--	--	3E-02	--
	Subsurface Soil	Incidental Ingestion	9E-08	--	--	--	1E-02	--
		Dermal Contact	2E-08	--	--	--	3E-04	--
		Total	1E-07	--	--	--	1E-02	--
	Groundwater - MW	Incidental Ingestion	0E+00	--	--	--	0E+00	--
		Dermal Contact	2E-09	--	--	--	3E-03	--
		Inhalation	3E-10	--	--	--	2E-04	--
		Total	2E-09	--	--	--	3E-03	--
	Groundwater - DPT	Incidental Ingestion	0E+00	--	--	--	0E+00	--
		Dermal Contact	1E-09	--	--	--	1E-05	--
		Inhalation	4E-12	--	--	--	2E-07	--
		Total	1E-09	--	--	--	1E-05	--
	Surface Water	Incidental Ingestion	4E-10	--	--	--	9E-05	--
		Dermal Contact	1E-10	--	--	--	3E-05	--
		Total	6E-10	--	--	--	1E-04	--
	Sediment	Incidental Ingestion	4E-08	--	--	--	1E-02	--
		Dermal Contact	3E-09	--	--	--	4E-04	--
		Total	5E-08	--	--	--	1E-02	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		2E-07				5E-02	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		2E-07				3E-02	
	Total Surface Soil, DPT Groundwater, Surface Water, and Sediment		2E-07				4E-02	
	Total Subsurface Soil, DPT Groundwater, Surface Water, and Sediment		2E-07				3E-02	
Site Maintenance Worker	Surface Soil	Incidental Ingestion	2E-08	--	--	--	9E-04	--
		Dermal Contact	2E-09	--	--	--	3E-05	--
		Total	3E-08	--	--	--	9E-04	--
	Subsurface Soil	Incidental Ingestion	2E-08	--	--	--	4E-04	--
		Dermal Contact	3E-09	--	--	--	6E-06	--
		Total	3E-08	--	--	--	4E-04	--
	Surface Water	Incidental Ingestion	3E-09	--	--	--	7E-05	--
		Dermal Contact	1E-09	--	--	--	2E-05	--
		Total	4E-09	--	--	--	9E-05	--
	Sediment	Incidental Ingestion	9E-08	--	--	--	3E-03	--
		Dermal Contact	4E-09	--	--	--	6E-05	--
		Total	1E-07	--	--	--	3E-03	--
	Total Surface Soil, Surface Water, and Sediment		1E-07				4E-03	
	Total Subsurface Soil, Surface Water, and Sediment		1E-07				4E-03	
Site Industrial Worker	Surface Soil	Incidental Ingestion	4E-07	--	--	--	2E-02	--
		Dermal Contact	4E-08	--	--	--	5E-04	--
		Total	5E-07	--	--	--	2E-02	--
	Subsurface Soil	Incidental Ingestion	4E-07	--	--	--	7E-03	--
		Dermal Contact	6E-08	--	--	--	1E-04	--
		Total	5E-07	--	--	--	7E-03	--
	Surface Water	Incidental Ingestion	3E-09	--	--	--	7E-05	--
		Dermal Contact	1E-09	--	--	--	2E-05	--
		Total	4E-09	--	--	--	9E-05	--
	Sediment	Incidental Ingestion	9E-08	--	--	--	3E-03	--
		Dermal Contact	4E-09	--	--	--	6E-05	--
		Total	1E-07	--	--	--	3E-03	--
	Total Surface Soil, Surface Water, and Sediment		6E-07				2E-02	
	Total Subsurface Soil, Surface Water, and Sediment		6E-07				1E-02	

TABLE 6-21
SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 1
NCBC GULFPORT
GULPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Adolescent Trespasser	Surface Soil	Incidental Ingestion	6E-08	--	--	--	2E-03	--
		Dermal Contact	1E-08	--	--	--	1E-04	--
		Total	7E-08	--	--	--	2E-03	--
	Subsurface Soil	Incidental Ingestion	6E-08	--	--	--	7E-04	--
		Dermal Contact	1E-08	--	--	--	2E-05	--
		Total	7E-08	--	--	--	8E-04	--
	Surface Water	Incidental Ingestion	7E-09	--	--	--	1E-04	--
		Dermal Contact	2E-09	--	--	--	4E-05	--
		Total	1E-08	--	--	--	2E-04	--
	Sediment	Incidental Ingestion	4E-07	--	--	--	1E-02	--
		Dermal Contact	2E-07	--	--	--	2E-03	--
		Total	6E-07	--	--	--	1E-02	--
	Total Surface Soil, Surface Water, and Sediment		7E-07				2E-02	
	Total Subsurface Soil, Surface Water, and Sediment		7E-07				1E-02	
Adult Trespasser	Surface Soil	Incidental Ingestion	6E-08	--	--	--	1E-03	--
		Dermal Contact	5E-09	--	--	--	3E-05	--
		Total	7E-08	--	--	--	1E-03	--
	Subsurface Soil	Incidental Ingestion	6E-08	--	--	--	5E-04	--
		Dermal Contact	7E-09	--	--	--	7E-06	--
		Total	7E-08	--	--	--	5E-04	--
	Surface Water	Incidental Ingestion	8E-09	--	--	--	9E-05	--
		Dermal Contact	5E-09	--	--	--	5E-05	--
		Total	1E-08	--	--	--	1E-04	--
	Sediment	Incidental Ingestion	2E-07	--	--	--	4E-03	--
		Dermal Contact	1E-08	--	--	--	7E-05	--
		Total	3E-07	--	--	--	4E-03	--
	Total Surface Soil, Surface Water, and Sediment		3E-07				5E-03	
	Total Subsurface Soil, Surface Water, and Sediment		3E-07				4E-03	

TABLE 6-21
SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 1
NCBC GULFPORT
GULPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Future Child Resident	Surface Soil	Incidental Ingestion	1E-06	--	--	--	2E-01	--
		Dermal Contact	8E-08	--	--	--	4E-03	--
		Total	1E-06	--	--	--	2E-01	--
	Subsurface Soil	Incidental Ingestion	1E-06	--	--	--	7E-02	--
		Dermal Contact	1E-07	--	--	--	1E-03	--
		Total	1E-06	--	--	--	7E-02	--
	Groundwater - MW	Incidental Ingestion	2E-05	--	Arsenic	--	6E+00	Arsenic, Iron, Thallium
		Dermal Contact	6E-08	--	--	--	6E-02	--
		Inhalation	0E+00	--	--	--	9E-03	--
		Total	2E-05	--	Arsenic	--	6E+00	Arsenic, Iron, Thallium
	Groundwater - DPT	Incidental Ingestion	2E-07	--	--	--	2E-03	--
		Dermal Contact	1E-07	--	--	--	7E-04	--
		Inhalation	2E-07	--	--	--	2E-03	--
		Total	6E-07	--	--	--	4E-03	--
	Surface Water	Incidental Ingestion	2E-08	--	--	--	2E-03	--
		Dermal Contact	1E-09	--	--	--	1E-04	--
		Total	2E-08	--	--	--	2E-03	--
	Sediment	Incidental Ingestion	2E-07	--	--	--	3E-02	--
		Dermal Contact	9E-09	--	--	--	6E-04	--
		Total	2E-08	--	--	--	4E-02	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		2E-05				6E+00	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		2E-05				6E+00	
	Total Surface Soil, DPT Groundwater, Surface Water, and Sediment		2E-06				2E-01	
	Total Subsurface Soil, DPT Groundwater, Surface Water, and Sediment		2E-06				1E-01	
Future Adult Resident	Surface Soil	Incidental Ingestion	4E-07	--	--	--	2E-02	--
		Dermal Contact	3E-08	--	--	--	4E-04	--
		Total	4E-07	--	--	--	2E-02	--
	Subsurface Soil	Incidental Ingestion	4E-07	--	--	--	7E-03	--
		Dermal Contact	4E-08	--	--	--	1E-04	--
		Total	4E-07	--	--	--	8E-03	--
	Groundwater - MW	Incidental Ingestion	4E-05	--	Arsenic	--	3E+00	--
		Dermal Contact	1E-07	--	--	--	3E-02	--
		Inhalation	0E+00	--	--	--	4E-03	--
		Total	4E-05	--	Arsenic	--	3E+00	--
	Groundwater - DPT	Incidental Ingestion	4E-07	--	--	--	7E-04	--
		Dermal Contact	2E-07	--	--	--	4E-04	--
		Inhalation	4E-07	--	--	--	7E-04	--
		Total	1E-06	--	--	--	2E-03	--
	Surface Water	Ingestion	3E-09	--	--	--	9E-05	--
		Dermal Contact	2E-09	--	--	--	5E-05	--
		Total	5E-09	--	--	--	1E-04	--
	Sediment	Incidental Ingestion	9E-08	--	--	--	4E-03	--
		Dermal Contact	4E-09	--	--	--	7E-05	--
		Total	1E-07	--	--	--	4E-03	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		4E-05				3E+00	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		4E-05				3E+00	
	Total Surface Soil, DPT Groundwater, Surface Water, and Sediment		1E-06				2E-02	
	Total Subsurface Soil, DPT Groundwater, Surface Water, and Sediment		1E-06				1E-02	

TABLE 6-21
SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 1
NCBC GULFPORT
GULPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Hypothetical Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	1E-06	--	--	--	NA	--
		Dermal Contact	1E-07	--	--	--	NA	--
		Total	1E-06	--	--	--	NA	--
	Subsurface Soil	Incidental Ingestion	1E-06	--	--	--	NA	--
		Dermal Contact	1E-07	--	--	--	NA	--
		Total	1E-06	--	--	--	NA	--
	Groundwater - MW	Incidental Ingestion	6E-05	--	Arsenic	--	NA	--
		Dermal Contact	2E-07	--	--	--	NA	--
		Inhalation	0E+00	--	--	--	NA	--
		Total	6E-05	--	Arsenic	--	NA	--
	Groundwater - DPT	Incidental Ingestion	6E-07	--	--	--	NA	--
		Dermal Contact	3E-07	--	--	--	NA	--
		Inhalation	6E-07	--	--	--	NA	--
		Total	2E-06	--	--	--	NA	--
	Surface Water	Incidental Ingestion	2E-08	--	--	--	NA	--
		Dermal Contact	3E-09	--	--	--	NA	--
		Total	3E-08	--	--	--	NA	--
	Sediment	Incidental Ingestion	3E-07	--	--	--	NA	--
		Dermal Contact	1E-08	--	--	--	NA	--
		Total	1E-07	--	--	--	NA	--
	Total Surface Soil, MW Groundwater, Surface Water, and Sediment		6E-05				NA	
	Total Subsurface Soil, MW Groundwater, Surface Water, and Sediment		6E-05				NA	
	Total Surface Soil, DPT Groundwater, Surface Water, and Sediment		3E-06				NA	
	Total Subsurface Soil, DPT Groundwater, Surface Water, and Sediment		3E-06				NA	

TABLE 7-1
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Non-Detects[1]		Ecological Screening Value	Maximum Hazard Quotient[2]	COPC (Yes/No)[3]
		Minimum	Maximum		Minimum	Maximum			
Volatile Organics (µg/kg)									
2-BUTANONE	2/21	1.8	4	01SS12	1.3	11	NA	NA	Yes
4-METHYL-2-PENTANONE	4/21	0.71	1.2	01SS015	0.54	11	NA	NA	Yes
TETRACHLOROETHENE	2/21	0.22	0.28	01SS137	0.9	11	10	0.03	No
Semivolatile Organics (µg/kg)									
BENZO(B)FLUORANTHENE	1/21	78	78	GPT-01-QT-04	34	420	1100	0.07	No
CAPROLACTAM	3/21	140	300	GPT-01-QT-09	72	420	NA	NA	Yes
DI-N-BUTYL PHTHALATE	1/21	53	53	GPT-01-QT-05	33	410	200000	0.0003	No
DIETHYL PHTHALATE	3/21	40	60	01SS015	36	420	100000	0.0006	No
TOTAL PAHS	1/21	78	78	GPT-01-QT-04	-	-	1000	0.08	No
Pesticides/PCBs (µg/kg)									
4,4'-DDE	4/21	0.58	1.5	01SS10	0.18	0.84	21	0.07	No
4,4'-DDT	7/20	0.23	2	01SS10	0.18	0.84	21	0.1	No
TOTAL DDT	7/21	0.31	3.5	01SS10	-	-	21	0.2	No
ALDRIN	3/21	0.16	6.3	01SS017	0.12	0.42	2.5	2.5	Yes
ALPHA-BHC	1/21	0.26	0.26	GPT-01-QT-05	0.12	0.41	2.5	0.1	No
BETA-BHC	4/20	0.16	0.36	GPT-01-QT-08	0.12	0.41	1.0	0.4	No
DELTA-BHC	1/21	0.26	0.26	01SS014	0.12	0.42	1.0[4]	0.3	No
GAMMA-BHC (LINDANE)	1/21	0.23	0.23	01SS139	0.12	0.42	0.05	4.6	Yes
ALPHA-CHLORDANE	5/21	0.23	4.9	01SS024	0.12	0.42	NA	NA	Yes
GAMMA-CHLORDANE	4/21	0.22	3.4	01SS024	0.12	0.42	NA	NA	Yes
AROCLOR-1260	1/21	17	17	01SS10	4.5	21	20	0.9	No
DIELDRIN	8/20	0.36	460	01SS025	0.18	0.84	4.9	93.9	Yes
ENDOSULFAN II	6/21	0.24	1.6	01SS420	0.18	0.84	NA	NA	Yes
ENDOSULFAN SULFATE	1/21	0.29	0.29	01SS014	0.18	0.84	NA	NA	Yes
ENDRIN ALDEHYDE	2/21	0.31	2	01SS10	0.18	0.84	1.0[5]	2.0	Yes
HEPTACHLOR	1/21	0.19	0.19	GPT-01-QT-08	0.12	0.42	NA	NA	Yes
HEPTACHLOR EPOXIDE	5/20	0.25	1.7	01SS10	0.12	0.42	NA	NA	Yes
METHOXYCHLOR	4/21	0.29	140	01SS017	0.12	0.42	NA	NA	Yes

TABLE 7-1
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Non-Detects(1)		Ecological Screening Value	Maximum Hazard Quotient(2)	COPC (Yes/No)3
		Minimum	Maximum		Minimum	Maximum			
Herbicides (µg/kg)									
2,4,5-T	3/21	1.2	6	GPT-01-QT-08	0.92	2.1	NA	NA	Yes
DINOSEB	1/6	8.8	8.8	GPT-01-QT-03	9.3	10	NA	NA	Yes
Inorganics (mg/kg)									
ALUMINUM	21/21	1770	12300	01SS138	-	-	50	246	Yes
ANTIMONY	2/21	1.1	3.6	01SS420	1	1.3	0.27	13.3	Yes
ARSENIC	19/21	0.78	4.8	GPT-01-QT-04	0.61	0.78	18	0.3	No
BARIUM	21/21	2	70	01SS017	-	-	330	0.2	No
CADMIUM	1/21	0.3	0.32	01SS014	0.2	0.26	0.36	0.9	No
CALCIUM	15/21	233	42400	01SS137	205	261	NA	NA	No
CHROMIUM	21/21	2.2	11	01SS420	-	-	26	0.4	No
COBALT	1/21	6.8	6.8	01SS017	1	1.3	13	0.5	No
COPPER	19/21	1.4	210	01SS015	1	1.3	28	7.5	Yes
IRON	21/21	546	9050	01SS017	-	-	200	45.3	Yes
LEAD	21/21	3.2	70.6	01SS420	-	-	11	6.4	Yes
MAGNESIUM	11/21	233	3390	GPT-01-QT-04	205	261	NA	NA	No
MANGANESE	21/21	1	358	01SS017	-	-	220	1.6	Yes
MERCURY	16/21	0.01175	0.059	GPT-01-QT-01	0.013	0.016	0.1	0.6	No
NICKEL	19/21	1.3	5.7	01SS138	1	1.3	38	0.2	No
SELENIUM	4/21	0.505	1.3	GPT-01-QT-06	0.61	0.78	0.52	2.5	Yes
SODIUM	3/21	188.75	329	01SS137	205	261	NA	NA	No
VANADIUM	21/21	2.7	16	01SS017	-	-	7.8	2.1	Yes
ZINC	21/21	1.7	89	01SS137	-	-	46	1.9	Yes

Notes
(1) Sample-specific quantitation limits.
(2) Hazard quotient (HQ) = maximum detected concentration ÷ ecological screening value.
(3) An analyte was an ecological chemical of potential concern (COPC) if the maximum detected concentration was greater than the ecological screening value (i.e., HQ>1), or if an ecological screening value was not available. However, calcium, magnesium, and sodium are nutrients that were not considered to be COPCs.
(4) Ecological screening value for beta-BHC.
(5) Ecological screening value for endrin.
NA = Ecological screening value not available.

TABLE 7-2
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SURFACE WATER
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Non-Detects[1]		Ecological Screening Value	Maximum Hazard Quotient[2]	COPC (Yes/No)[3]
		Minimum	Maximum		Minimum	Maximum			
Volatile Organics (µg/L)									
1,1,2-TRICHLOROTRIFLUOROETHANE	1/5	6.6	6.6	01SW04	1	1	NA	NA	Yes
ACETONE	5/5	3.4	5.1	01SW02	-	-	NA	NA	Yes
CARBON DISULFIDE	2/5	0.18	0.2	01SW03	1	1	NA	NA	Yes
TOLUENE	1/5	0.22	0.22	01SW04	1	1	175	0.001	No
Semivolatile Organics (µg/L)									
CAPROLACTAM	5/5	0.91	2.1	01SW04	-	-	NA	NA	Yes
Pesticides/PCBs (µg/L)									
ALPHA-CHLORDANE	1/5	0.004	0.004	01SW04	0.0092	0.0098	0.0043	0.9	No
Herbicides (µg/L)									
2,4,5-TP (SILVEX)	4/5	0.044	0.067	01SW01	0.069	0.069	NA	NA	Yes
Inorganics (µg/L)									
ALUMINUM	5/5	430	1690	01SW04	-	-	87	19.4	Yes
ARSENIC	1/5	3.4	3.4	01SW01	3	3	190	0.02	No
BARIUM	5/5	20.75	30.1	01SW05	-	-	NA	NA	Yes
CALCIUM	5/5	13200	24800	01SW04	-	-	NA	NA	No
IRON	5/5	1720	2410	01SW01	-	-	1000	2.4	Yes
LEAD	2/5	1.6	2	01SW03	1.5	1.5	1.32	1.5	Yes
MAGNESIUM	5/5	1160	1560	01SW04	-	-	NA	NA	No
MANGANESE	5/5	26.3	53.1	01SW01	-	-	NA	NA	Yes
POTASSIUM	1/5	1080	1080	01SW04	1000	1000	NA	NA	No
SODIUM	5/5	5220	5940	01SW01	-	-	NA	NA	No
ZINC	5/5	5.4	10.4	01SW05	-	-	58.91	0.2	No

Notes
(1) Sample-specific quantitation limits.
(2) Hazard quotient (HQ) = maximum detected concentration ÷ ecological screening value.
(3) An analyte was an ecological chemical of potential concern (COPC) if the maximum detected concentration was greater than the ecological screening value (i.e., HQ>1), or if an ecological screening value was not available. However, calcium, magnesium, potassium, and sodium are nutrients that were not considered to be COPCs.
NA = Ecological screening value not available.

TABLE 7-3
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SEDIMENT
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Non-Detects[1]		Ecological Screening Value	Maximum Hazard Quotient[2]	COPC (Yes/No)[3]
		Minimum	Maximum		Minimum	Maximum			
Volatile Organics (µg/kg)									
2-BUTANONE	4/5	5.8	80	01SD01	12	12	NA	NA	Yes
ACETONE	2/5	28	220	01SD01	12	12	NA	NA	Yes
TOLUENE	1/5	33	33	01SD01	12	12	NA	NA	Yes
Semivolatile Organics (µg/kg)									
4-METHYLPHENOL	1/5	420	420	01SD01	400	470	NA	NA	Yes
BENZO(A)PYRENE	1/5	190	190	01SD01	400	470	330	0.6	No
BENZO(B)FLUORANTHENE	1/5	330	330	01SD01	400	470	NA	NA	Yes
BENZO(K)FLUORANTHENE	1/5	220	220	01SD01	400	470	NA	NA	Yes
BIS(2-ETHYLHEXYL)PHTHALATE	5/5	74	450	01SD01	-	-	182	2.5	Yes
CHRYSENE	1/5	400	400	01SD01	400	470	330	1.2	Yes
DIETHYL PHTHALATE	3/5	52	220	01SD01	410	470	NA	NA	Yes
FLUORANTHENE	1/5	1300	1300	01SD01	400	470	330	3.9	Yes
PHENANTHRENE	1/5	360	360	01SD01	400	470	330	1.1	Yes
PYRENE	1/5	930	930	01SD01	400	470	330	2.8	Yes
TOTAL PAHS	1/5	3730	3730	01SD01	-	-	1684	2.2	Yes
Pesticides/PCBs (µg/kg)									
4,4'-DDE	3/5	0.41	0.91	01SD03	0.81	3.5	3.3	0.3	No
ALDRIN	1/5	0.325	0.45	01SD03	0.4	1.7	NA	NA	Yes
ALPHA-BHC	1/5	0.17	0.17	01SD05	0.4	1.7	NA	NA	Yes
ALPHA-CHLORDANE	4/5	0.85	6	01SD01	0.4	0.41	1.7[4]	3.5	Yes
DELTA-BHC	1/5	2.1	2.1	01SD01	0.4	0.48	NA	NA	Yes
DIELDRIN	3/5	0.73	1.8	01SD03	0.43	3.5	3.3	0.5	No
GAMMA-CHLORDANE	4/5	0.52	3.5	01SD01	0.4	0.41	1.7[4]	2.1	Yes
HEPTACHLOR EPOXIDE	1/5	0.46	0.46	01SD05	0.3	1.7	NA	NA	Yes

TABLE 7-3
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SEDIMENT
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Non-Detects(1)		Ecological Screening Value	Maximum Hazard Quotient(2)	COPC (Yes/No)3
		Minimum	Maximum		Minimum	Maximum			
Inorganics (mg/kg)									
ALUMINUM	5/5	1000	17200	01SD01	-	-	NA	NA	Yes
ARSENIC	4/5	0.81	19.8	01SD01	0.74	0.74	7.24	2.7	Yes
BARIUM	5/5	5.3	61.2	01SD01	-	-	NA	NA	Yes
BERYLLIUM	1/5	1.1	1.1	01SD01	0.24	0.29	NA	NA	Yes
CALCIUM	3/5	229.25	5050	01SD01	245	259	NA	NA	No
CHROMIUM	5/5	1.1	17.6	01SD01	-	-	52.3	0.3	No
COPPER	1/5	11.7	11.7	01SD01	1.2	1.5	18.7	0.6	No
IRON	5/5	650	28100	01SD01	-	-	NA	NA	Yes
LEAD	5/5	1.9	32.1	01SD01	-	-	30.2	1.1	Yes
MANGANESE	5/5	1.5	295	01SD01	-	-	NA	NA	Yes
NICKEL	1/5	6.4	6.4	01SD01	1.2	1.5	15.9	0.4	No
VANADIUM	5/5	1.4	32.2	01SD01	-	-	NA	NA	Yes
ZINC	5/5	4.2	132	01SD01	-	-	124	1.1	Yes

Notes
(1) Sample-specific quantitation limits.
(2) Hazard quotient (HQ) = maximum detected concentration ÷ ecological screening value.
(3) An analyte was an ecological chemical of potential concern (COPC) if the maximum detected concentration was greater than the ecological screening value (i.e., HQ>1), or if an ecological screening value was not available. However, calcium (a nutrient) was not considered to be a COPC.
(4) Ecological screening value for chlordane.
NA = Ecological screening value not available.

TABLE 7-4
DATA SUMMARY FOR SURFACE SOIL ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Detection Limits(1)		Average Conc.(2)	Ecological Screening Value (ESV)	Maximum Hazard Quotient	Number of Detects > ESV	Number of Nondetects > ESV
		Min.	Max.		Min.	Max.					
Volatile Organics (µg/kg)											
2-BUTANONE	2/21	1.8	4	01SS12	1.3	11	4.1	NA	NA	-	-
4-METHYL-2-PENTANONE	4/21	0.71	1.2	01SS015	0.54	11	3.0	NA	NA	-	-
Semivolatile Organics (µg/kg)											
CAPROLACTAM	3/21	140	300	GPT-01-QT-09	72	420	173.4	NA	NA	-	-
Pesticides/PCBs (µg/kg)											
ALDRIN	3/21	0.16	6.3	01SS017	0.12	0.42	0.5	2.5	2.5	1	0
GAMMA-BHC (LINDANE)	1/21	0.23	0.23	01SS139	0.12	0.42	0.2	0.05	4.6	1	20
ALPHA-CHLORDANE	5/21	0.23	4.9	01SS024	0.12	0.42	0.5	NA	NA	-	-
GAMMA-CHLORDANE	4/21	0.22	3.4	01SS024	0.12	0.42	0.4	NA	NA	-	-
DIELDRIN	8/20	0.36	460	01SS025	0.18	0.84	24.7	4.9	93.9	3	0
ENDOSULFAN II	6/21	0.24	1.6	01SS420	0.18	0.84	0.4	NA	NA	-	-
ENDOSULFAN SULFATE	1/21	0.29	0.29	01SS014	0.18	0.84	0.3	NA	NA	-	-
ENDRIN ALDEHYDE	2/21	0.31	2	01SS10	0.18	0.84	0.4	1.0	2.0	1	0
HEPTACHLOR	1/21	0.19	0.19	GPT-01-QT-08	0.12	0.42	0.2	NA	NA	-	-
HEPTACHLOR EPOXIDE	5/20	0.25	1.7	01SS10	0.12	0.42	0.4	NA	NA	-	-
METHOXYCHLOR	4/21	0.29	140	01SS017	0.12	0.42	7.1	NA	NA	-	-
Herbicides (µg/kg)											
2,4,5-T	3/21	1.2	6	GPT-01-QT-08	0.92	2.1	1.3	NA	NA	-	-
DINOSEB	1/6	8.8	8.8	GPT-01-QT-03	9.3	10	5.5	NA	NA	-	-
Inorganics (mg/kg)											
ALUMINUM	21/21	1770	12300	01SS138	-	-	6723.8	50	246.0	21	-
ANTIMONY	2/21	1.1	3.6	01SS420	1	1.3	0.7	0.27	13.3	2	19
COPPER	19/21	1.4	210	01SS015	1	1.3	14.0	28	7.5	1	0
IRON	21/21	546	9050	01SS017	-	-	3622.7	200	45.3	21	-
LEAD	21/21	3.2	70.6	01SS420	-	-	15.4	11	6.4	7	-
MANGANESE	21/21	1	358	01SS017	-	-	31.8	220	1.6	1	-
SELENIUM	4/21	0.505	1.3	GPT-01-QT-06	0.61	0.78	0.4	0.52	2.5	3	17
VANADIUM	21/21	2.7	16	01SS017	-	-	8.6	7.8	2.1	13	-
ZINC	21/21	1.7	89	01SS137	-	-	18.7	46	1.9	2	-

Notes
(1) Sample-specific quantitation limits in non-detected samples.
(2) Average concentration of all samples calculated using ½ the detection limit for nondetected samples.
NA = Ecological screening value not available.

TABLE 7-5
DATA SUMMARY FOR SURFACE WATER ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Detection Limits(1)	Average Conc.(2)	Ecological Screening Value (ESV)	Maximum Hazard Quotient	Number of Detects > ESV	Number of Nondetects > ESV
		Min.	Max.							
Volatile Organics (µg/L)										
1,1,2-TRICHLOROTRIFLUOROETHANE	1/5	6.6	6.6	01SW04	1	1.7	NA	NA	NA	NA
ACETONE	5/5	3.4	5.1	01SW02	-	4.4	NA	NA	NA	NA
CARBON DISULFIDE	2/5	0.18	0.2	01SW03	1	0.38	NA	NA	NA	NA
Semivolatile Organics (µg/L)										
CAPROLACTAM	5/5	0.91	2.1	01SW04	-	1.26	NA	NA	NA	NA
Herbicides (µg/L)										
2,4,5-TP (SILVEX)	4/5	0.044	0.067	01SW01	0.069	0.049	NA	NA	NA	NA
Inorganics (µg/L)										
ALUMINUM	5/5	430	1690	01SW04	-	836	87	19.4	5	-
BARIUM	5/5	20.75	30.1	01SW05	-	27.4	NA	NA	NA	NA
IRON	5/5	1720	2410	01SW01	-	2078	1000	2.4	5	-
LEAD	2/5	1.6	2	01SW03	1.5	1.2	1.32	1.5	2	3
MANGANESE	5/5	26.3	53.1	01SW01	-	38.2	NA	NA	NA	NA

Notes
(1) Sample-specific quantitation limits in non-detected samples.
(2) Average concentration of all samples calculated using ½ the detection limit for nondetected samples.
NA = Ecological screening value not available.

TABLE 7-6
DATA SUMMARY FOR SEDIMENT ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Analyte	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Detection Limits(1)		Average Conc.(2)	Ecological Screening Value (ESV)	Maximum Hazard Quotient	Number of Detects > ESV	Number of Nondetects > ESV
		Min.	Max.		Min.	Max.					
Volatile Organics (µg/kg)											
2-BUTANONE	4/5	5.8	80	01SD01	12	12	22.2	NA	NA	-	-
ACETONE	2/5	28	220	01SD01	12	12	53.2	NA	NA	-	-
TOLUENE	1/5	33	33	01SD01	12	12	11.4	NA	NA	-	-
Semivolatile Organics (µg/kg)											
4-METHYLPHENOL	1/5	420	420	01SD01	400	470	254.0	NA	NA	-	-
BENZO(B)FLUORANTHENE	1/5	330	330	01SD01	400	470	236.0	NA	NA	-	-
BENZO(K)FLUORANTHENE	1/5	220	220	01SD01	400	470	214.0	NA	NA	-	-
BIS(2-ETHYLHEXYL)PHTHALATE	5/5	74	450	01SD01	-	-	164.5	182	2.5	1	0
CHRYSENE	1/5	400	400	01SD01	400	470	250.0	330	1.2	1	4
DIETHYL PHTHALATE	3/5	52	220	01SD01	410	470	163.7	NA	NA	-	-
FLUORANTHENE	1/5	1300	1300	01SD01	400	470	430.0	330	3.9	1	4
PHENANTHRENE	1/5	360	360	01SD01	400	470	242.0	330	1.1	1	4
PYRENE	1/5	930	930	01SD01	400	470	356.0	330	2.8	1	4
TOTAL PAHS	1/5	3730	3730	01SD01	-	-	746.0	1684	2.2	1	-
Pesticides/PCBs (µg/kg)											
ALDRIN	1/5	0.325	0.45	01SD03	0.4	1.7	0.37	NA	NA	-	-
ALPHA-BHC	1/5	0.17	0.17	01SD05	0.4	1.7	0.3	NA	NA	-	-
ALPHA-CHLORDANE	4/5	0.85	6	01SD01	0.4	0.41	3.0	1.7	3.5	3	0
DELTA-BHC	1/5	2.1	2.1	01SD01	0.4	0.48	0.6	NA	NA	-	-
GAMMA-CHLORDANE	4/5	0.52	3.5	01SD01	0.4	0.41	1.8	1.7	2.1	3	0
HEPTACHLOR EPOXIDE	1/5	0.46	0.46	01SD05	0.3	1.7	0.38	NA	NA	-	-
Inorganics (mg/kg)											
ALUMINUM	5/5	1000	17200	01SD01	-	-	4928.0	NA	NA	-	-
ARSENIC	4/5	0.81	19.8	01SD01	0.74	0.74	4.7	7.24	2.7	1	0
BARIUM	5/5	5.3	61.2	01SD01	-	-	17.6	NA	NA	-	-
BERYLLIUM	1/5	1.1	1.1	01SD01	0.24	0.29	0.3	NA	NA	-	-
IRON	5/5	650	28100	01SD01	-	-	6632.3	NA	NA	-	-
LEAD	5/5	1.9	32.1	01SD01	-	-	14.8	30.2	1.1	2	-
MANGANESE	5/5	1.5	295	01SD01	-	-	62.3	NA	NA	-	-
VANADIUM	5/5	1.4	32.2	01SD01	-	-	9.2	NA	NA	-	-
ZINC	5/5	4.2	132	01SD01	-	-	34.0	124	1.1	1	-

Notes
(1) Sample-specific quantitation limits in non-detected samples.
(2) Average concentration of all samples calculated using ½ the detection limit for nondetected samples.
NA = Ecological screening value not available.

TABLE 7-7
FOOD CHAIN MODEL - ECOLOGICAL HAZARD QUOTIENTS
PISCIVOROUS RECEPTORS - CONSERVATIVE SCENARIO
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Green Heron		Mink	
	HQ_{NOAEL}	HQ_{LOAEL}	HQ_{NOAEL}	HQ_{LOAEL}
Pesticides/PCBs				
ALDRIN	NA	NA	3.7E-03	7.3E-04
ALPHA-BHC	6.2E-04	1.5E-04	2.0E-02	2.0E-03
ALPHA-CHLORDANE	1.5E-02	3.0E-03	5.6E-03	2.8E-03
DELTA-BHC	7.7E-03	1.9E-03	2.4E-01	2.4E-02
GAMMA-CHLORDANE	4.1E-03	8.2E-04	1.5E-03	7.7E-04
HEPTACHLOR EPOXIDE	NA	NA	7.5E-03	7.5E-04
Inorganics				
ARSENIC	1.0E+00	5.0E-01	1.8E+00	4.2E-01
LEAD	2.0E+00	7.3E-02	5.9E-01	1.5E-02
ZINC	2.3E+00	9.0E-01	1.6E+00	4.2E-01

Notes:
Cells are shaded if the value is greater than 1.0
HQ - Ecological Hazard Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
NA - HQ could not be calculated because avian NOAEL and LOAEL were not available.

TABLE 7-8
FOOD CHAIN MODEL - ECOLOGICAL HAZARD QUOTIENTS
PISCIVOROUS RECEPTORS - AVERAGE SCENARIO
SITE 1
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Green Heron		Mink	
	HQ_{NOAEL}	HQ_{LOAEL}	HQ_{NOAEL}	HQ_{LOAEL}
Pesticides/PCBs				
ALDRIN	NA	NA	9.8E-04	2.0E-04
ALPHA-BHC	1.0E-03	2.5E-04	1.1E-02	1.1E-03
ALPHA-CHLORDANE	6.9E-03	1.4E-03	9.1E-04	4.6E-04
DELTA-BHC	2.0E-03	5.0E-04	2.3E-02	2.3E-03
GAMMA-CHLORDANE	1.9E-03	3.9E-04	2.6E-04	1.3E-04
HEPTACHLOR EPOXIDE	NA	NA	2.0E-03	2.0E-04
Inorganics				
ARSENIC	5.7E-02	2.9E-02	4.3E-02	9.8E-03
LEAD	1.6E-01	5.7E-03	2.1E-02	5.2E-04
ZINC	1.4E-01	5.6E-02	3.7E-02	9.3E-03

Notes:
HQ - Ecological Hazard Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
NA - HQ could not be calculated because avian NOAEL and LOAEL were not available.

APPENDIX C

ARARs AND TBC CRITERIA

TABLE C-1

ARARs AND TBC CRITERIA
SITE 1
NCBC GULFPORT, MISSISSIPPI

NAME / CITATION	REQUIREMENT	TYPE / PREREQUISITES	CATEGORY
	FEDERAL		
HMTA Regulations (49 CFR Parts 171-178, and Subparts of 40 CFR 261, 262 and 263 as detailed below)	Provides requirements for packaging, labeling, manifesting and transporting of hazardous materials	Applicable If any waste debris, contaminated soil or sediment is excavated and transported off-site, that material would need to be managed IAW these regulations as detailed below.	Action-specific
49 CFR 171.1(c)	Shall be subject to and must comply with applicable provisions of the HMTA and DOT HMR at 49 CFR 171-178.	Applicable Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped a hazardous material.	Action-specific
40 CFR 261.4(d)(1)(i)-(iii) Transportation of samples (i.e., solid waste, soils and wastewaters)	Are not subject to any requirements of 40 CFR Parts 261 through 268 or 270 when: • The sample is being transported to a laboratory for the purpose of testing. • The sample is being transported back to the sample collector after testing. • The sample is being stored by sample collector before transport to a laboratory for testing.	Applicable Samples of solid waste or a sample of water, soil for purpose of conducting testing to determine its characteristics or composition	Action-specific
RCRA Regulations - Hazardous Waste Determinations by Generators of Solid Waste (40 CFR Part 261 Subpart A through E and 262 Subpart A as defined below)	Provides requirements for the proper identification and characterization of hazardous waste	Applicable Should site activities generate solid wastes, determining whether those wastes are hazardous must be done IAW these requirements.	Action-specific
40 CFR 261.2 and 4, 262.11(a)	Must determine if solid waste is a hazardous waste using the following method: Should first determine if waste is excluded from regulation under 40 CFR 261.4	Applicable Generation of solid waste as defined in 40 CFR 261.2(a).	Action-specific

TABLE C-1

ARARs AND TBC CRITERIA
SITE 1
NCBC GULFPORT, MISSISSIPPI

NAME / CITATION	REQUIREMENT	TYPE / PREREQUISITES	CATEGORY
40 CFR 261.3 (a), 261.4(a) 262.11(b)	Must determine if waste is listed as hazardous waste under 40 CFR Part 261.3(a)	Applicable Generation of solid waste which is not excluded under 40 CFR 261.4(a).	Action-specific
40 CFR 261.4(a) and 262.11(c)	Must determine whether the waste is (characteristic waste) identified in subpart C of 40 CFR Part 261 by either: 1) Testing the waste according to the methods set forth in Subpart C of 40 CFR part 261 2) Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.	Applicable Generation of solid waste which is not excluded under 40 CFR 261.4(a).	Action-specific
Executive Order 11988 - Floodplain Management, Section 2(a)(2), 2(d)	Provides requirements for assessing alternatives to mitigate / avoid possible adverse impacts to floodplains	TBC Potential impacts of planned site activities must be assessed and alternatives implemented where possible, to avoid or minimize adverse impacts to floodplains.	NA
Safe Drinking Water Act Maximum Contaminant Levels (MCLs), 40 CFR 141.61-141.62	Provides for the protection of drinking water sources. MCLs consider health factors as well as economic and technical feasibility of removing a contaminant.	Relevant and Appropriate Media-specific numerical standards that apply to public water supplies.	Chemical-specific
STATE			
TRGs MS Administrative Code, Title 11, Part 3, Chapter 2, Appendix A, Tier 1 TRG Table	Establish default screening levels and human health risk-based cleanup goals for soil and groundwater	Applicable Media-specific numerical standards as shall apply to remedial actions in the State of Mississippi will be satisfied.	Chemical -specific
Hazardous Waste Management Regulations MS Administrative Code, Title 11, Part 3, Chapter 1	Provide requirements for the proper management (treatment, storage and disposal) of hazardous waste. MS is a RCRA-authorized state and uses the federal regulations directly. Refer to the federal regulations for the citations.	Applicable Should hazardous wastes be generated those substantive portions (if any) more stringent than their federal RCRA counterpart(s) must be satisfied.	Action-specific

TABLE C-1

ARARs AND TBC CRITERIA
SITE 1
NCBC GULFPORT, MISSISSIPPI

NAME / CITATION	REQUIREMENT	TYPE / PREREQUISITES	CATEGORY
Nonhazardous Solid Waste Management Regulations MS Administrative Code, Title 11, Part 4, Chapter 1: Rule 1.4 (E)(2)(b) – (e) (for cover); (E)(3)(c)(1) (for post-closure care); (D)(2)(a) and (d)(1) (for groundwater monitoring)	Provides requirements for the cover; post-closure care; and monitoring of non-hazardous waste landfills	Relevant and Appropriate While not directly applicable to Site 1, these regulations establish otherwise relevant landfill cover maintenance and groundwater monitoring standards for similar landfills which will be met for Site 1.	Action-specific
Storm Water Management - Water Pollution Control Act, MS Administrative Code Title 11, Part 6, Subchapter 1, 1.1.4 (I)	Provides requirements for controlling pollutants in storm water runoff from land disturbing activities < 5 acres	Applicable On-site activities associated with soil cap construction will comply with these requirements and applicable conditions in NCBC Gulfport's MS4 General NPDES Permit, No. MSRMS4036.	Action-specific
Air Emission Regulations for the Prevention, Abatement, and Control of Air Contaminants, Specific Criteria for Sources of Particulate Matter, MS Administrative Code Title 11, Part 2, 1.3(C)	Provides requirements for controlling emissions of particulate matter during land grading and clearing activities	Applicable Reasonable measures to control fugitive dust emissions from on-site soil disturbing activities will be instituted.	Action-specific

Notes:

HMTA = Hazardous Materials Transportation Act

HMR = Hazardous Materials Regulations

CAA = Federal Clean Air Act, as amended

CFR = Code of Federal Regulations

RCRA = Federal Resource Conservation and Recovery Act, as amended

IAW = in accordance with

NPDES = National Pollutant Discharge Elimination System

TBC = to be considered

TRGs = Target Remediation Goals