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NCBC GULFPORT
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FINAL DECISION DOCUMENT FOR SITE 2 WORLD WAR II LANDFILL NCBC GULFPORT MS

1/1/2015

TETRA TECH

DECISION DOCUMENT

SITE 2 – WORLD WAR II LANDFILL

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT
GULFPORT, MISSISSIPPI

CONTRACT NUMBER N62470-08-D-1001
CONTRACT TASK ORDER JM50

January 2015

1.0 Declaration

1.1 Site Name and Location

Site 2 – World War II Landfill at Naval Construction Battalion Center (NCBC) Gulfport, Mississippi.

1.2 Statement of Basis and Purpose

This Decision Document (DD) presents the selected remedy for previously landfilled wastes and associated contaminated soils and groundwater at Site 2 – World War II Landfill (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 supplementing the existing soil cover where needed to ensure a permanent, minimum cover thickness of two feet over all landfill wastes. To complete the landfill cover, the following activities will be performed; filling in the golf course pond; re-grading and adding soil cover to selected areas; the installation and maintenance a vegetative cover; long-term monitoring (LTM) for groundwater; and land use controls (LUCs) to prevent cover disturbance, incompatible land uses, and/or exposure to or use of groundwater. This DD does not include or affect any other sites at NCBC Gulfport and only documents the remedial action selected for Site 2. 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 carcinogenic polynuclear aromatic hydrocarbons (cPAHs) in soil and arsenic, iron, and cPAHs in groundwater pose unacceptable risk to human health under current and hypothetical future land use scenarios. 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 LUCs, will be used for waste that poses a relatively low long-term threat where treatment is impracticable.

FIGURE 1-1. SITE LOCATION MAP

1.4 DESCRIPTION OF SELECTED REMEDY

The remedy selected for the Site 2 landfill is based largely 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 "Applicable 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 2 based upon the age and location of that landfill, characteristics of the materials previously disposed in the landfill (primarily municipal type wastes with relatively minor amounts of the following: waste fuel, oil, solvents, paint, and paint thinners), and sampling data evidencing a lack of significant methane gas emissions.

The specific components of the selected remedy for Site 2 include the following:

- Containment of landfill wastes to prevent direct contact with buried waste and eliminate migration of impacted soils. Containment will be achieved using a minimum soil cover thickness of 2 feet over the portion of the landfill area that has either
- Filling the golf course pond with clean fill material;
- Limited re-grading of the existing surface soil west of the golf course pond to prevent ponding and promote drainage and site reuse;
- Establishing a soil cover of not less than 2 feet above the buried waste;
- Establishing and maintaining native grass or other shallow-rooted vegetation cover suitable to minimize soil erosion;
- LUCs to control site access, ensure that future use of the property is limited to non-residential and non-agricultural activities, prohibit landfill cover disturbance, and prevent future use of contaminated groundwater. LUC maintenance will be evaluated through regular site inspections.
- LTM of the groundwater to evaluate contaminant concentrations in groundwater and ensure that the groundwater contamination is not migrating off site; and

- Inspection of the landfill area to ensure that the integrity of the cover is maintained and determine maintenance needs to ensure the acceptable performance of the soil cover.

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 a training area. This DD does not include or affect any other sites at the installation and only documents the final remedial action at Site 2. 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, the selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable and relevant and appropriate to the remedial action, and is cost-effective. This remedy does not satisfy the statutory preference for treatment, but was selected because the relatively low contaminant concentrations, lack of potential current and future receptors and because site conditions are better suited to waste containment and the types and amounts of contamination present to not constitute primary threat wastes and active treatment is deemed impracticable.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on the 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

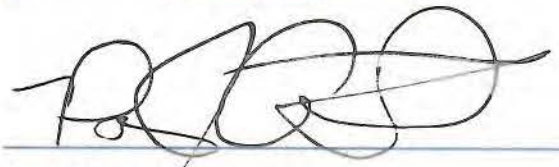
The information required to be included in the DD and the section it can be found in are summarized in Table 1-1. Additional information can be found in the Administrative Record file for NCBC Gulfport.

TABLE 1-1. DD DATA CERTIFICATION CHECKLIST

DATA	LOCATION IN DD
Constituents of concern (COCs) and their respective concentrations	Sections 2.6 and 2.8
Baseline risk represented by the COCs	Section 2.8
Cleanup levels established for COCs and the basis for these levels	Sections 2.8 and 2.9
How source materials constituting principal threats are addressed	Section 2.12
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the risk assessment	Section 2.7
Potential land and groundwater uses that will be available at the site as a result of the selected remedy	Section 2.13.3
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 2.13.1

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



22JAN15

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 and 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 construction equipment and materials.

Site 2 is a former landfill located on NCBC Gulfport north of 8th Street and east of Colby Avenue (see Figure 2-1). Site 2 was operated from 1942 to 1948 as the primary disposal area for general refuse collected in base dumpsters. Site 2 encompasses approximately 8 acres. The majority of the waste disposed at Site 2 is characterized as municipal-type wastes and general refuse that includes primarily inert material such as paper, cardboard, wood, and garbage. Relatively minor and limited volumes of liquid wastes such as paints, paint thinners, solvents, oils and fuels were reportedly disposed of at the site. Because much of the waste was burned at the site, flammable liquids and materials disposed of at the site were incinerated.

The disposal operation at Site 2 consisted of burning combustible materials in a structure located at the northern end of the site. The ash, along with the non-combustible material, was then pushed to the southern end of the site and buried in trenches. Wastes were placed in the unlined trenches at or near the groundwater table.

Figure 2-1. Site Location Map

Reportedly, the trenches were deeper than 8 feet, and standing water was present in the open trenches. No reports were found to indicate the disposal of high-level military wastes or munitions. The waste disposal area at Site 2 was covered with soil when disposal activities ceased in 1948. Additional fill was added as part of the construction of a golf course, which closed in 2011.

Site 2 is bordered on the north by Site 7 (see Figure 1-1), which is being addressed under a separate remedy, to the south and west by roads, and a wooded area to the east. Surface water is conveyed to ditches along the southern and western boundaries of the site. Storm water from the golf course pond flows east to a culvert that discharges into a ditch south of 8th Street.

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 installation 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 2. Results of these investigations indicate potential risk to human receptors from elevated concentrations of cPAH in soil and in groundwater, arsenic, iron, and cPAHs.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
Initial Assessment Study (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, surface water and sediment sampling, and monitoring well installation and groundwater sampling. Sediment and surface water were analyzed for select metals (cadmium, chromium, and lead), oil and grease, total organic carbon, total organic halides, and chemical oxygen demand. Low levels of chromium and lead were detected less than regulatory levels in the sediment sample. Groundwater samples were analyzed for select metals (cadmium, chromium, and lead), volatile organic compounds (VOCs), and extractable organics. Low levels of chlorinated VOCs were detected below the regulatory levels in one monitoring well.
Basewide Groundwater, Surface Water, and Sediment Investigation	1994	Investigated six sites identified in the IAS. Three existing monitoring wells near Site 2 were sampled for VOCs, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, herbicides, dioxins and furans, and total petroleum hydrocarbons. One detection of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) was found in a monitoring well north of Site 2 and near Site 7. Recommendations included resampling Site 7, but nothing specific for Site 2.
Basewide Groundwater Investigation	1999	Additional groundwater investigations were conducted to determine the extent of dioxin and dioxin-related chemicals. Monitoring wells were installed and sampled downgradient of Sites 1, 2, 3, and 7 based on surficial aquifer flow directions. None of the newly installed downgradient monitoring wells at Sites 1, 2, and 3 contained measured concentrations of dioxins.
Site 2 Remedial Investigation (RI) Field Investigation	2013	Surface and subsurface soil, sediment, surface water, and groundwater samples were collected during the RI in 2011. Soil and groundwater samples were analyzed for VOCs, Target Compound List SVOCs, pesticides, polychlorinated biphenyls (PCBs), herbicides, and inorganics. In addition, four monitoring wells were sampled for dioxins and furans. Surface water and sediment samples were analyzed for VOCs, SVOCs, pesticides, PCBs, herbicides, metals, and cyanide. A human health and ecological assessment concluded that exposure to contaminated media poses an unacceptable threat in various scenarios.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
Additional Sampling/Landfill Cover Assessment	2012	In September 2012, vertical waste profile sampling was conducted at Site 2 to verify the depth to landfill waste at the site. Forty-eight profile samples were collected, and waste was found at a depth of 2 feet below land surface (bls) or less at 17 locations. Additional soil samples were collected from 12 locations and analyzed for metals, dioxins, furans, and hexavalent chromium. The results of the soil analytical program are consistent with the containment strategy of the presumptive remedy and the direct observation of the field samples, and waste profiling confirmed the waste disposal area defined by the geophysical investigation.
Feasibility Study (FS)	2014	Summarized additional sampling data collected in 2012. Included identification of Remedial Action Objectives (RAOs) and the development and evaluation of remedial alternatives. Established the suitability of the presumptive remedy including limited excavation, waste containment, LUCs, and 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.

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 2.

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.

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 2 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.

To search the Administrative Record, you can also visit the public website at http://www.navfac.navy.mil/products_and_services/ev/products_and_services/env_restoration/installation_map/navfac_atlantic/southeast/naval_construction_battalion_center_gulfport.html

In accordance with Sections 113 and 117 of CERCLA, the Navy provided a public comment period from December 2, 2014, to January 5, 2015, for the proposed remedial action described in the Proposed Plan for Site 2. A public meeting to present the Proposed Plan was held on December 2, 2014, at the Downtown Gulfport Public Library. Public notice of the meeting and availability of documents were published in The Sun Herald on November 22, 2014.

2.4 SCOPE AND ROLE OF THE ACTION

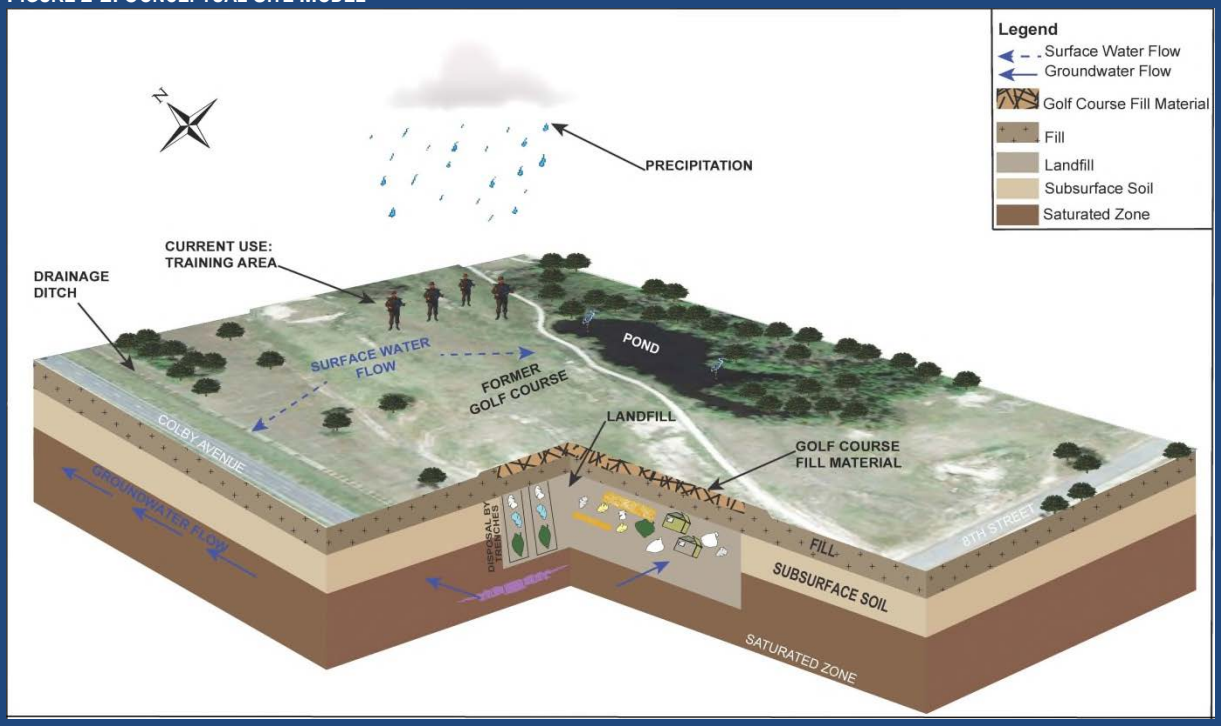
Site 2 has been included in part of the Navy's ER Program. Although the installation has not been placed on USEPA's National Priorities List, the Navy is conducting investigations and cleanup activities following CERCLA and, to the extent practicable, the NCP in consultation with MDEQ as a supporting agency under CERCLA. The overall strategy for the ER Program at the installation is to perform cleanup on a site-by-site basis to ensure protection of human health and the environment and to support installation operations and overall Department of Defense mission accomplishment.

Investigations at Site 2 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 ecological receptors. Previous actions taken in response to the contamination at Site 2 are summarized in Table 2-1. 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 installation operations. The remedy will reduce risks to human health and the environment associated with soil and groundwater contamination. There are no known unacceptable risks for surface water and sediment.

2.5 SITE CHARACTERISTICS

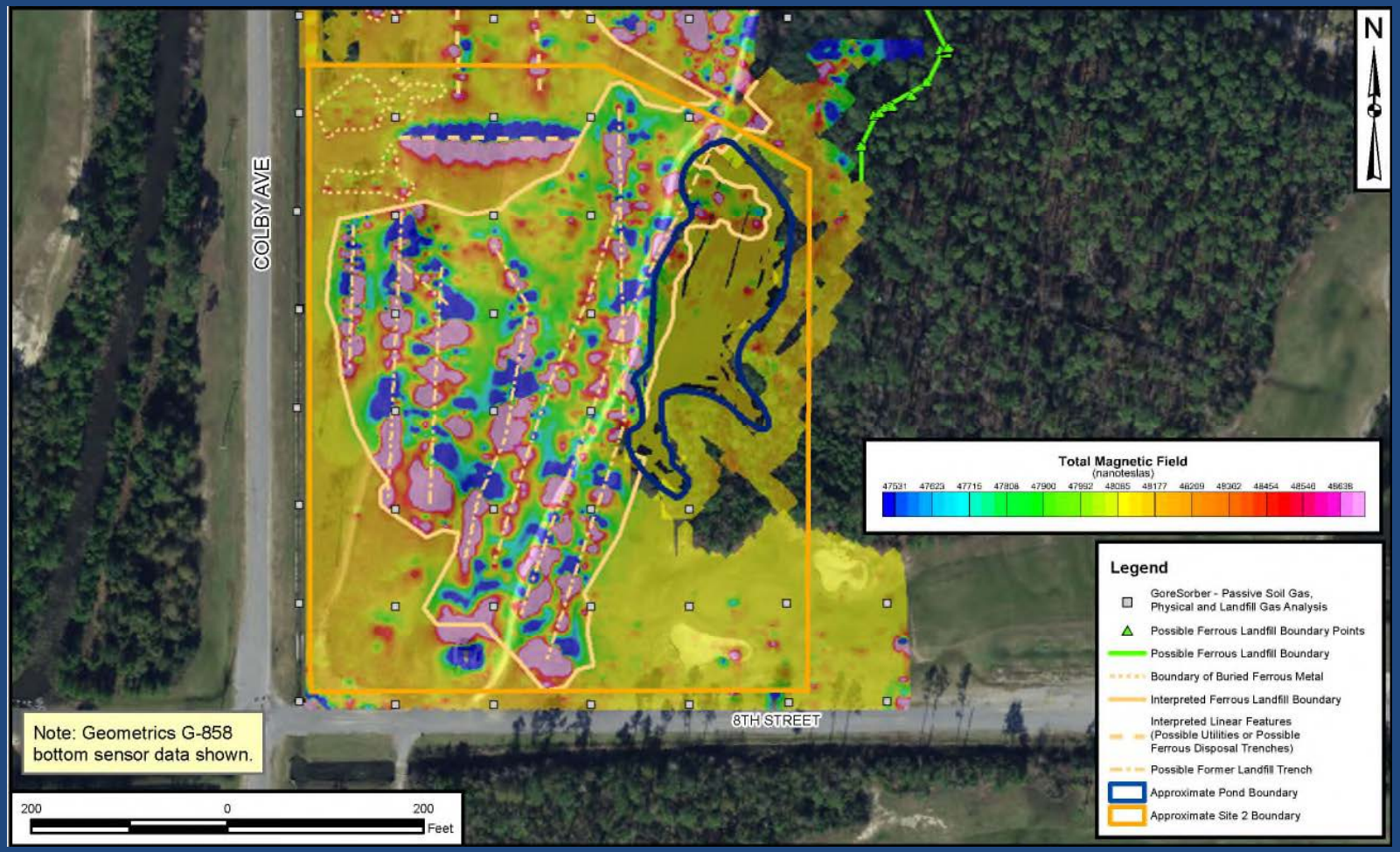
Figure 2-2 presents the Site 2 Conceptual Site Model (CSM), which identifies the waste disposal area, media of concern, and receptors under current and future land use scenarios. At Site 2, the waste disposal boundary was established based on the results of a geophysical survey (see Figure 2-3) that indicated linear patterns of ferrous iron that is interpreted as the landfill trenches. The landfill area defined by the geophysical survey was approximately 750 feet by 450 feet or approximately 8 acres.

FIGURE 2-2. CONCEPTUAL SITE MODEL



Visual observations of the drilling spoils at 48 locations further aided the vertical delineation of the waste disposal and soil cover. These findings are consistent with the reported disposal activities at Site 2.

FIGURE 2-3. GEOPHYSICAL SURVEY



Site 2 is located north of 8th Street and east of Colby Street and was used as part of the former Pine Bayou Golf Course until 2011. The site is mainly a grassy area with a golf course pond located to the east. The site topography is relatively flat with elevations 20 to 24 feet above mean sea level.

Surface and shallow subsurface soils in the Site 2 area are primarily gray and brown sand to sandy silt with varying amounts of gravel and minor clay horizons. The uppermost 2 feet in most areas is fill material. Below the fill material, typical lithologies are light brown and gray fine sands and silty fine sands to depths of 7 to 15 feet bls. These strata are typical of Pleistocene and Recent age terrace and stream valley deposits. The Citronelle Formation is present below the Terrace Deposits in most areas. Citronelle lithologies include white and brown fine sands with rusty orange and purple mottling. Some horizons contain stringers of fine, sub rounded, quartz gravel or shell fragments to depths of up to 20 feet bls.

The top of a gray silt unit with sand and clay is encountered at a depth of approximately 30 feet bls. This clay-rich layer is persistent across the site with a thickness of 5 feet and represents a transition from the Citronelle to the Graham Ferry.

Below the gray clayey sand layer, gray silty sand, and sand lithologies are present at depths ranging from 35 to 40 feet bls. This sand unit is 5 feet thick over most of the site. At depths of approximately 40 feet, a much more plastic green-gray clayey silt layer was encounter. This layer is the Graham Ferry member of the Pensacola Formation. This layer may represent an aquitard that separates the shallow surficial aquifer from deeper water-bearing units.

Storm water at Site 2 is managed in ditches on the southern and western sides of the site and in a golf course pond on the eastern side of the site. The drainage ditch to the south discharges storm water to Canal No. 1 on the southern side of 8th Street. The canal on the western side of Site 2 receives limited runoff from the western portion of Site 2 and discharges south of 28th Street at Outfall 3.

2.6 NATURE AND EXTENT AND FATE AND TRANSPORT OF CONTAMINATION

Analytical results for samples collected from Site 2 were screened against MDEQ and USEPA criteria to identify COCs and areas of potential contamination. The media evaluated to determine the nature and extent of contamination at Site 2 included surface soil, subsurface soil, groundwater, surface water, and sediment. The COCs identified at this stage were further evaluated in the human health and ecological risk assessment and is discussed in Section 2.8.

Several cPAHs were detected in surface and subsurface soil and groundwater samples at concentrations exceeding USEPA and MDEQ criteria. Limited toxicity values are available to evaluate the carcinogenic effects from exposure to PAHs. The most extensively studied PAH is benzo(a)pyrene (BAP), which is classified by the USEPA as a probable human carcinogen. The risk assessment evaluated toxic effects for cPAHs by using toxicity equivalence factors (TEFs) based on the potency of each compound relative to that of BAP. The TEFs are used to convert each individual cPAH concentration into an equivalent concentration of BAP. cPAHs (as BAP equivalents) were retained as COCs in soil and groundwater. Groundwater COCs also include arsenic and iron. Soil sampling locations and results with exceedances above MDEQ criteria are presented on Figure 2-4. Groundwater monitoring wells and results with exceedances above MDEQ criteria are presented on Figure 2-5.

Dioxin toxic equivalence quotients (TEQs) were calculated for soil samples analyzed for dioxins. The TEQs in all but two samples were less than the unrestricted Target Remediation Goal (TRG) established by the MDEQ for soil and the TRG established by the state of Mississippi for TCDD of 4.26 nanograms per kilograms (ng/kg). One location, 02SB29 located at the northeastern corner of the investigation, had a dioxin TEQ of 23.5 ng/kg Based on the location of this sample and the findings from the Site 7 investigation, this area will be incorporated into Site 7 and addressed by the Site 7 remedy. The second location, 02SB25, had a TEQ of 4.55 ng/kg, which was a slight exceedance of the MDEQ TRG. A 95 percent upper confidence level was calculated for the RI and additional soil samples, excluding the result for the 02SB29 location. This value was 2.12 ng/kg, which is less than the unrestricted TRG of 4.26 ng/kg. Based on this TEQ value and the incorporation of the area around 02SB29 into Site 7, dioxins are not considered a COC for soil.

FIGURE 2-4. SURFACE AND SUBSURFACE SOIL SAMPLING RESULTS

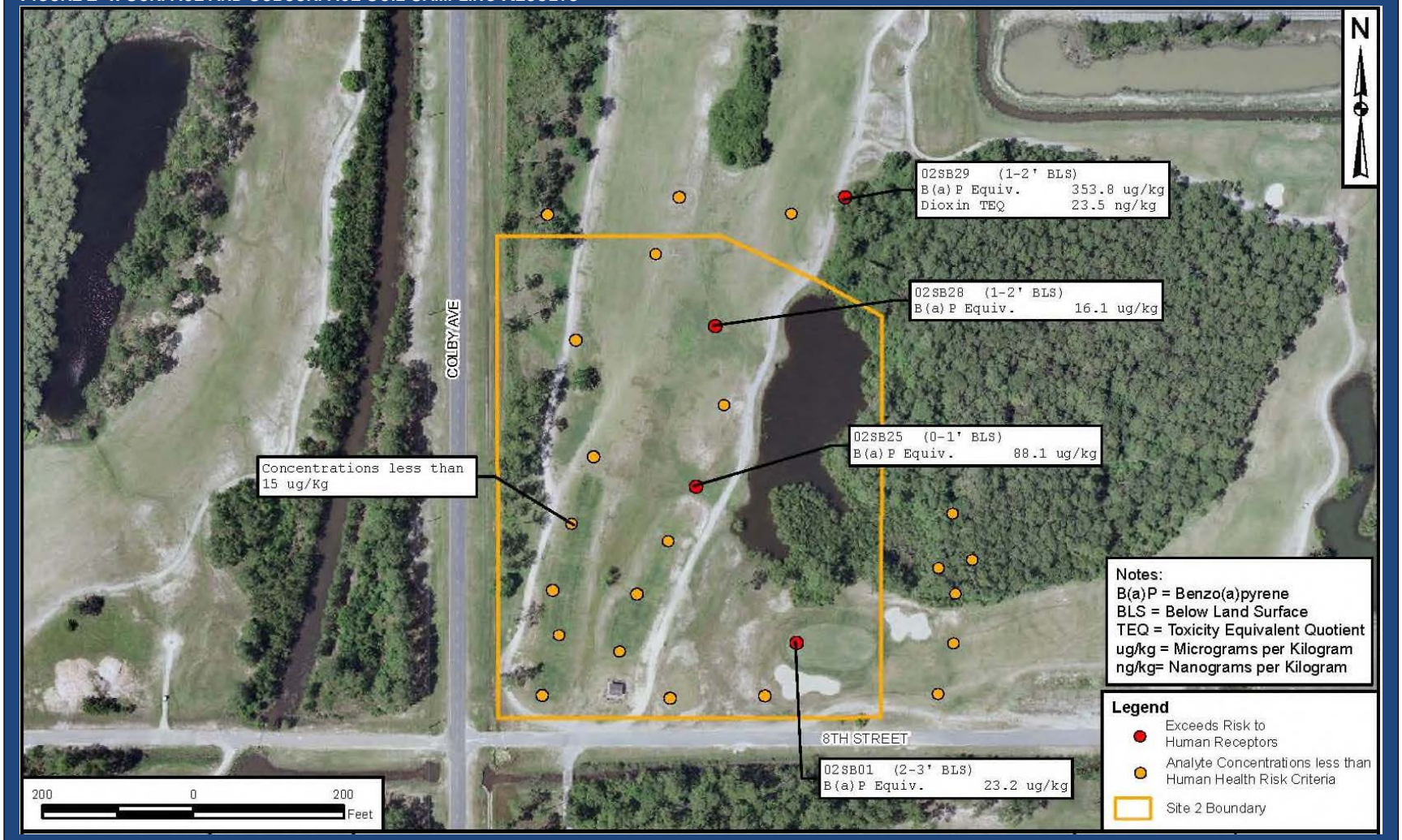


FIGURE 2-5. GROUNDWATER SAMPLING RESULTS

Arsenic was detected in most of the additional soil and sediment samples and was the only metal detected in soil with concentrations exceeding human health direct exposure criteria. The arsenic concentrations were within concentration ranges typical for Mississippi Coastal Flatwoods soil. Because arsenic concentrations were within the accepted background range, arsenic was not considered a COC for soil.

Total chromium concentrations did not exceed soil screening levels (SSLs) or state of Mississippi TRGs at any of the 12 additional sampling locations. Hexavalent chromium concentrations were less than the laboratory detection limits. As a result, chromium (total or hexavalent) was not considered a COC for soil.

Aluminum and iron were the only metals with detected concentrations that exceeded their USEPA Region 4 ecological screening values (ESVs). There is uncertainty regarding quantifying risks to soil invertebrates and plants posed by aluminum and iron. Because Site 2 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 contaminants of potential concern (COPCs) in the soil have more impact to site plants than mowing (particularly for shrubs, vines, and trees), and these analytes were not retained as COCs.

Several organochlorine insecticides were detected in surface soil and sediment samples, but endrin ketone and gamma-benzene hexachloride (BHC) were the only insecticides with detected concentrations that exceeded their USEPA Region 4 ESVs. Concentrations of these pesticides were low, and it is likely that these reported concentrations at Site 2 are due to prior lawful applications of such products at the buildings onsite; as a result, pesticides were not retained as COCs for these receptors.

Surface water in the ditches is temporary and occurs only after storm events. The chemicals detected in surface water included persistent organic compounds (the pesticide Alpha-BHC and the PAH benzo-a-pyrene). Both are likely associated with other base activities and urban run-off and neither of these compounds was detected in the surface soil at Site 2. Given that the majority of storm water comes from offsite sources and that the persistent organic compounds are not soluble, the observed detections are not likely the result from releases from the Site 2 landfill.

Based on the evaluation of existing conditions at Site 2, the following potential contaminant transport pathways 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 of particulate migration from surface soil to the atmosphere.

The unique hydrology at Site 2 strongly influences fate and transport of chemicals at the site and is a significant factor in selecting an appropriate remedy. Groundwater conditions fluctuate throughout the year but the buried waste at Site 2 is below groundwater the majority of the year. Secondarily, the groundwater gradient at the site is very low, resulting in very little net transport of groundwater and potential contaminant migration away from the original disposal locations. Due to these conditions, a low permeability cover would not significantly influence the interactions between groundwater and the buried waste. Further, the COCs identified share chemical and physical properties (low solubility and affinity for bonding to soil) that limit mobilization and transport from the site.

While these site conditions limit the potential for contaminant mobility, they also present significant difficulties and limited options for treatment to the point where the CERCLA preference for restoration to beneficial use may not be practicable.

2.7 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 the 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 installation 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.

2.8 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 Human Health Risk Assessment (HHRA) and Screening Level Ecological Risk Assessment were conducted as part of the Site 2 RI.

2.8.1 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 COPCs, exposure assessment, toxicity assessment, and risk characterization.

Identification of COPCs

Table 6-14 from the RI (included in Appendix B) presents exposure point concentrations (EPCs) for the COPCs identified at Site 2. 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 2 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 2 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 and subsurface soils, groundwater, surface water, and sediment were identified as the media of concern for the COPCs. 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 2 are summarized in Table 2-2.

TABLE 2-2. RECEPTORS AND EXPOSURE ROUTES EVALUATED IN THE HHRA	
RECEPTOR	**EXPOSURE ROUTE**
Construction/Excavation Workers (future)	Soil/surface water/sediment incidental ingestion Soil/groundwater/surface water dermal contact Inhalation of volatiles in groundwater (in a trench during excavation)
Maintenance/Industrial Workers (current and future)	Soil (surface/subsurface)/surface water/sediment incidental ingestion Soil (surface/subsurface)/surface water/sediment dermal contact Inhalation of air/dust/emissions
Recreational Users/Trespassers (adolescent and adult) (current and future)	Soil (surface/subsurface)/surface water/sediment ingestion Soil (surface/subsurface)/surface water/sediment dermal contact Inhalation of air/dust/emissions
On-Base Residents (adults/children) (future)	Soil (surface/subsurface)/surface water/sediment incidental ingestion Soil (surface/subsurface)/sediment/surface water/groundwater dermal contact Inhalation of air/dust/emissions Ingestion of groundwater Inhalation of volatiles from groundwater

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 COPC. 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 that potential for adverse effects. The toxicity data is summarized in Tables 6-15 through 6-17 and Tables 6-20 through 6-23 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 contamination. Potential cancer risks and non-cancer hazards were calculated 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.

$$Risk = CDI \times SF$$

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 $mg/kg\text{-}day^{-1}$)

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 the RME scenario indicates that an individual experiencing the reasonable and 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 6-24 and 6-25 from the RI (included in Appendix B) present the CTE and RME risks for Site 2.

The carcinogenic risks calculated from the RME case compared incremental lifetime cancer risks (ILCRs) to 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 2 were attributed to the following:

Industrial worker	Surface soil	Arsenic and chromium
	Subsurface soil	Arsenic and chromium
Future child resident	Surface Soil	Arsenic and chromium
	Subsurface Soil	Arsenic and chromium
	Groundwater	Arsenic, iron, chromium, cPAHs as BAP equivalents, TCDD, and 1,4-dichlorobenzene
	Sediment	Chromium
Future adult resident	Surface soil	Chromium
	Subsurface soil	Arsenic and chromium
	Groundwater	Arsenic, iron, chromium, cPAHs as BAP equivalents, TCDD, 1,3-dichlorobenzene, and 1,4-dichlorobenzene
Lifelong resident	Surface soil	Arsenic and chromium
	Subsurface soil	Arsenic and chromium
	Groundwater	Arsenic, iron, chromium, cPAHs as BAP equivalents, TCDD, 1,3-dichlrobenzene, and 1,4-dichlorobenzene
	Sediment	Arsenic and chromium

Several cPAHs were detected in the additional soil samples collected in 2012 at concentrations exceeding human health direct exposure criteria. The cPAH concentrations in surface and subsurface soil represent excess cancer risk of 3×10^{-5} ILCR to the lifetime resident receptor when BAP equivalent concentrations exceed 11.8 micrograms per kilogram (µg/kg). As a result, cPAHs (as BAP equivalents) are retained as COCs for soil.

BAP equivalent concentrations for cPAHs were calculated for each of the monitoring wells sampled at Site 2. cPAHs were detected in one deep monitoring well sample with a maximum detected concentration of 0.109 microgram per liter (µg/L) at GPT-02-9, which is screened from 39 to 44 feet bls. The BAP equivalent concentrations detected in Site 2 groundwater samples was less than the maximum contaminant level (MCL) established by the USEPA for drinking water and the TRG established by the state of Mississippi based on the MCL for BAP equivalents of 0.2 µg/L. The site specific risk assessment indicates a contribution to the total cancer risk from the BAP equivalent concentrations of 3.5×10^{-5} to hypothetical child residents. As a result, cPAHs as BAP equivalents are retained as COCs for groundwater.

The carcinogenic risks calculated for the CTE case indicated that cumulative ILCRs for all receptors with the exception of lifelong recreational users/trespassers and hypothetical residents were less than MDEQ's acceptable level of 1×10^{-6}. While cumulative ILCRs for lifelong recreational users/trespassers exceed MDEQ's acceptable risk level, the media-specific ILCRs for all media were less than MDEQ's acceptable risk level.

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 the 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-carcinogen 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:

Noncancer HQ = CDI/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).

When the detected chromium concentrations were evaluated as total chromium, the risk levels are less than the human health benchmarks. Total chromium concentrations did not exceed SSLs or state of Mississippi TRGs at any of the additional sampling locations collected in 2012. When evaluated as hexavalent chromium, the risk assessment identified potential risk for residential receptors exposed to Site 2 groundwater. Soil sample analysis for hexavalent chromium reported concentrations less than the laboratory detection limit, suggesting there is not a source for hexavalent chromium at this site. Because the total chromium risk values appear to be protective to human health at this site, chromium is not retained as a COC for soil or groundwater.

Arsenic was detected in most of the soil samples and was the only metal detected in soil with concentrations exceeding human health direct exposure criteria. The arsenic concentrations were within concentration ranges typical for Mississippi Coastal Flatwoods soil. Because arsenic concentrations were within the accepted background range, arsenic is not considered a COC for soil.

The arsenic concentrations in groundwater represent excess cancer risk of 1 X 10^{-4} ILCR to the lifetime resident receptor when arsenic concentrations are greater than 0.33 µg/L and non-cancer risk of 2.0 HI for the child resident receptor when arsenic concentrations are greater than 2.4 µg/L. The concentrations of arsenic detected in most of the Site 2 groundwater samples were less than the MCL (established by the USEPA for drinking water and the TRG established by the state of Mississippi based on the MCL for arsenic) of 10 µg/L.

The iron concentrations in groundwater represent a non-cancer risk of 3.0 HI for the child resident receptor when iron concentrations are greater than 6,867 µg/L. To better define the future risk associated with the metal concentrations in groundwater, iron and arsenic are retained as COCs for groundwater.

Arsenic and iron will be included in the LTM portion of the presumptive remedy until background metals concentrations in groundwater can be determined or the concentrations are reduced to less than the threshold value.

Dioxin TEQs were calculated for the four monitoring wells sampled for dioxin. The TEQs detected in Site 2 groundwater samples were less than the MCL established by the USEPA for drinking water and the TRG established by the state of Mississippi based on the MCL for TCDD of 30 picograms per liter. As a result, dioxins are not retained as COC for groundwater.

In one monitoring well sample, 1,3-dichlorobenzene was detected with a maximum detected concentration of 1.24 µg/L at GPT-02-12. The concentration of 1,3-dichlorobenzene detected in Site 2 groundwater samples was less than risk-based TRG established by the state of Mississippi of 5.48 µg/L. The site specific risk assessment indicates a contribution to the total cancer risk from 1,3-dichlorobenzene of 3.3 x 10^{-8}. As a result, 1,3-dichlorobenzene is not retained as a COC.

In one monitoring well sample, 1,4-dichlorobenzene was detected with a maximum detected concentration of 3.73 µg/L at GPT-02-12. The concentration of 1,4-dichlorobenzene detected in Site 2 groundwater samples was less than the MCL established by the USEPA for drinking water and the TRG established by the state of Mississippi based on the MCL for 1,4-dichlorobenzene of 75 µg/L. The site specific risk assessment indicates a contribution to the total cancer risk from 1,4-dichlorobenzene of 1.4 x 10^{-7}. As a result, 1,3-dichlorobenzene is not retained as a COC.

No major sources of uncertainty, other than those typically associated with risk assessment estimates were identified in the Site 2 HHRA.

After all the risk calculations, the COCs identified are as follows:

- Surface Soil – cPAHs (as BAP equivalents)
- Subsurface Soil – cPAHs (as BAP equivalents)
- Groundwater – Arsenic, iron, cPAHs (as BAP equivalents)
- Surface Water – None
- Sediment – None

2.8.2 Summary of Ecological Risk

Tables 7-1 to 7-7 from the RI (included in Appendix B) summarize the ecological risk evaluation for Site 2. Based on the ecological risk assessment, risks are minimal and further evaluation is not warranted at Site 2.

Risks to Soil Invertebrates and Plants

Surface soil samples were analyzed for dioxins/furans during the 2011 RI and additional sampling conducted in 2012. ESVs or alternate toxicity thresholds for soil invertebrates and plants are not available; therefore, potential risks to soil invertebrates and plants from dioxins/furans could not be quantitatively evaluated. However, concentrations of dioxins/furans were not especially high, and plants and invertebrates are relatively insensitive to these contaminants.

Numerous metals were detected in surface soil at the site, but aluminum and iron were the only metals with detected concentrations that exceeded their USEPA Region 4 ESVs. There is uncertainty regarding risks to soil invertebrates and plants posed by aluminum and iron, but concentrations of these two metals are probably not related to activities of the former landfill.

Detected concentrations of cPAHs in surface soil were less than their ESVs, indicating that these compounds do not pose risks to soil invertebrates and plants.

Several organochlorine insecticides were detected in surface soil samples, but endrin ketone and gamma BHC were the only insecticides with detected concentrations that exceeded their USEPA Region 4 ESVs. Concentrations of these two COPCs were relatively low, and it is unclear whether their concentrations at Site 2 are due to historical use at NCBC Gulfport or to landfill wastes.

Risk to Benthic Invertebrates and Aquatic Organisms

Surface water and sediment samples were analyzed for dioxins/furans. TCDD TEQ concentrations in surface water and sediment were less than their respective ESVs; therefore, to the extent that these samples are adequately representative of dioxins/furans data for Site 2. Dioxins/furans do not pose risks to aquatic and benthic receptors at the site.

Lead and mercury sediment concentrations in two samples from the golf course pond east of the former landfill might pose risks to benthic receptors, but concentrations were less than probable effect concentrations. Cumulative toxicity from multiple metals could pose risks to benthic receptors at one location.

Aluminum and iron concentrations in surface water exceeded their ESVs in some samples, indicating potential risks to aquatic receptors. Manganese concentrations in the two surface water samples from the ditch south of 8th Street exceeded its alternative toxicity value, indicating potential risks to aquatic receptors.

cPAHs do not pose risks to aquatic and benthic receptors at the site.

Several pesticides were COPCs in sediment; all are organochlorine insecticides that are no longer used but are known to be extremely persistent in sediment and soil. Although risk to benthic receptors cannot be ruled out, the HQs are not especially high, and average concentrations tended to be less than ESVs. The relatively low concentrations of pesticides in Site 2 sediment suggest that their presence is probably due to historical pesticide usage for insect control rather than to landfill-related activities.

Risk to Piscivorous Birds and Mammals

Food-chain modeling was conducted to evaluate potential risks to representative insectivorous and piscivorous receptors from ingested doses of surface soil COPCs, sediment COPCs, and surface water COPCs that are known to bioaccumulate or biomagnify. 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 2. Although Site 2 is relatively flat and most precipitation presumably infiltrates into the sandy soils at the site, during periods of heavy rainfall, surface water on the eastern side of the former landfill flows east toward the golf course pond, and surface water on the western side of the site flows west toward a concrete-lined ditch along the eastern edge of Colby Avenue. The concrete lined ditch alongside Colby Avenue conveys storm water northward where it exits NCBC Gulfport at outfalls along 28th Street. Site related impacts to insectivorous in surface soil and piscivorous receptors in sediment and surface water from bioaccumulative COPCs are not expected.

2.8.3 Basis for Action

Unacceptable human health risks were estimated for hypothetical future residential exposure to soil due to cPAHs as BAP equivalents and hypothetical future residential exposure to groundwater due to cPAHs as BAP equivalents, arsenic, and iron.

Additionally, the landfilled waste is assumed to present an inherent risk requiring further action. 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.

2.9 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 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 2.10. The COCs for surface and subsurface soil are cPAHs as BAP equivalents. COCs for groundwater are cPAHs as BAP equivalents, arsenic, and iron. The RAOs for Site 2 consist of the following:

- **RAO 1:** Prevent direct contact with landfill/disposal area contents and surrounding subsurface soil; therefore, eliminating unacceptable human exposure scenarios for COCs in soil and landfill waste.
- **RAO 2:** Prevent direct contact with contaminated surface soils.
- **RAO 3:** Prevent direct exposure routes for human receptors for COCs in groundwater.

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

Based on data from the RI and additional soil characterization, the volume of soil/buried waste to be addressed is approximately 19,000 cubic yards within a surface area of approximately 216,000 square feet. The extent of the landfill and remediation boundaries are shown on Figure 2-6.

2.10 DESCRIPTION OF ALTERNATIVES

To address potential unacceptable human health risks associated with soil and groundwater at Site 2, as well as the inherent risk presented by landfill material, a preliminary technology screening evaluation was conducted in the FS. While acknowledging the site specific circumstances must be taken into account, USEPA's presumptive remedy guidance contemplates as default remedial components use of landfill cap/cover, source area groundwater control to contain any plume, institutional controls to supplement engineering controls, etc.

Based on guidance from the USEPA (*Data Requirements for Selecting Remedial Action Technology,* USEPA, 1987), active gas collection/venting is generally required when vadose zone methane concentrations exceed either 1) 5 percent methane at the property line or cap edge or 2) 25 percent lower explosive limit (LEL) in or at on-site structures. A soil/landfill gas survey conducted in 2008 did not detect soil gas exceeding the instrument detection levels for both methane concentration and LEL; thus, construction of a landfill gas-venting system was deemed not necessary.

In-situ treatment options were not considered based on the type and volume if contamination (e.g., buried waste material) at Site 2. 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, discussion amongst the NCBC Gulfport ER Partnering Team ensued about the landfill trenches being located within or near a flood plain. The result of the discussions included understanding that a low permeable cover and gas venting system was not necessary. The Navy and MDEQ determined that a minimum 2 feet of soil with a vegetative cover would sufficiently prevent human exposure and would not result in landfill gas accumulation, thus, negating the need for landfill gas monitoring.

Subsequent to the completion of the FS, the Navy requested that a treatment option for metals in groundwater be evaluated as part of the most comprehensive remediation alternative to make it more complete. The costs for this component of the remedial alternatives have not been incorporated into the FS and are based on an engineer's order of magnitude estimate of standard technologies using history and literature.

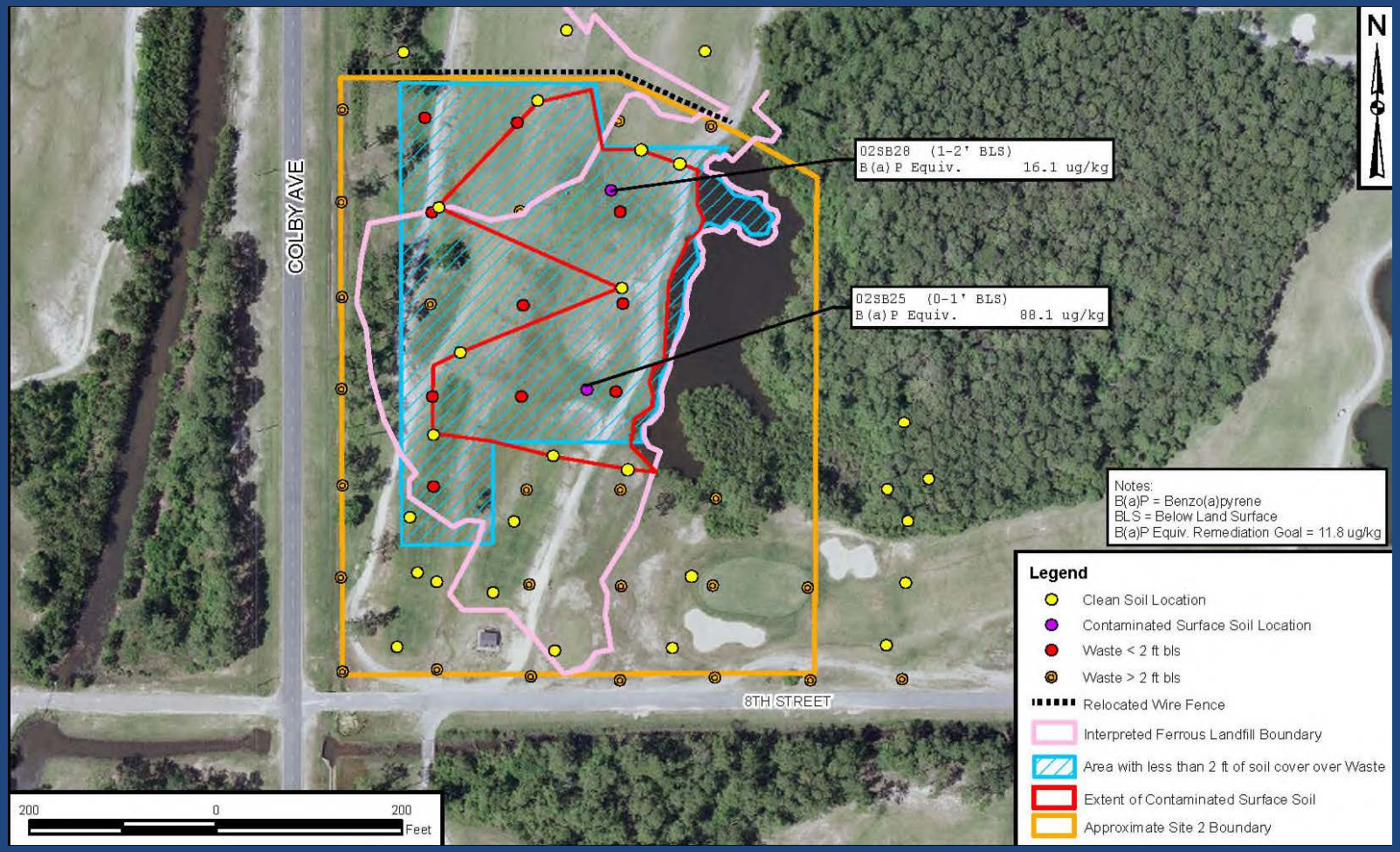
Since the Site 2 landfill qualifies for application of the USEPA's presumptive remedy guidance for military landfills, technology screening was not utilized prior to developing site remedial alternatives and the presumptive remedy was only compared to the USEPA's required No Action Alternative. Consistent with the NCP, the No Action alternative was evaluated as a baseline.

Application of the USEPA's complete presumptive remedy for the Site 2 landfill is appropriate for the following reasons:

- Risks are low level except for hot spots. Soil, groundwater, surface water, and sediment data were collected during the RI in 2011 and subsequent sampling in 2012 indicated that concentrations of most analytes were less than MDEQ TRGs.

- Treatment of wastes is usually impracticable due to the volume and heterogeneity of the waste. The majority of the material identified at Site 2 was non-hazardous debris and 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.

FIGURE 2-6. EXTENT OF LANDFILL AND REMEDIATION BOUNDARIES



- Waste types include household, commercial, nonhazardous sludge, and industrial waste solids. The IAS reported that an unknown amount of non-hazardous solids and debris were disposed in trenches and buried and that the waste was generated from on-site operations.

- Lesser quantities of hazardous wastes are presented 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 types of waste disposal at Site 2.

Table 2-3 describes the major components of the selected remedy and provides estimated costs associated with each of the three remedial alternatives evaluated to achieve the RAO's established for Site 2 in response to site specific conditions. Because the site qualifies for application of USEPA's waste containment presumptive remedy, consistent with the previously referenced USEPA guidance applicable to military landfills and NCP requirements, the Navy evaluated the following three alternatives:

TABLE 2-3. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

ALTERNATIVE	COMPONENTS	DETAILS	COST
Alternative 1: **No Action** *No action to address contaminated soil and no use restrictions*	None	No action.	No cost
Alternative 2: **Presumptive Remedy** (Cover and LUC/LTM) *Fill the golf course pond, re-grade surface soil, containment of landfill (soil cover), and site use controls to preclude exposure to buried wastes, contaminated soil and groundwater along with future site monitoring.*	Waste Containment	Fill in the golf course pond with clean fill material, limited re-grading of the existing surface soil west of the golf course pond to prevent ponding and promote drainage and site reuse, containment of the landfill using a minimum soil cover thickness of 2 feet, and establish and maintain a vegetative cover. Soil/vegetative cover would contain waste and minimize exposure.	**Capital:** $1,166,000 **Annual O&M Cost:** $25,000 **30-Year NPW:** $1,812,000 **Time Frame:** 30 years
	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.	
	Groundwater Monitoring	Collect and analyze groundwater samples from 12 monitoring wells for selected parameters.	
Alternative 3: **Treatment and Capping** *Source containment and site use controls to preclude exposure to buried wastes, contaminated soil, and groundwater along with future site monitoring.*	Waste Containment Chemical Treatment	Limited re-grading of the existing surface soil, engineered soil cap would consist of four layers (from top to bottom): erosion layer of topsoil, a low permeability layer, a gas-venting layer, and common fill layer. Soil/vegetative cover would contain waste and minimize exposure. Chemical oxidation injected barrier at 5-year intervals to treat iron and arsenic in groundwater.	**Capital**: $4,719,000 **Annual O&M Cost**: $31,000 **30-Year NPW**: $5,319,000 **Time Frame**: 30 years
	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.	

TABLE 2-3. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED			
ALTERNATIVE	COMPONENTS	DETAILS	COST
	Monitoring	Collect and analyze groundwater samples from 12 monitoring wells for selected parameters. Methane gas would be monitored as well.	

Because of the applicability of USEPA waste containment presumptive remedy for military landfills to Site 2, a formal technology screening was not undertaken prior to the Navy's development of these three alternatives although a preliminary technology screening was conducted as part of the FS. In-situ soil treatment options were not considered based upon the type and volume of contamination (i.e. buried waste materials) present at Site 2.

2.11 COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 2-4 and subsequent text in this section summarizes 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), which are categorized as either threshold, primary balancing, or modifying. Further information on the detailed comparison of remedial alternatives is presented in the Site 2 FS.

TABLE 2-4. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES			
CERCLA CRITERION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
Overall Protection of Human Health and the Environment	○	●	●
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	○	●	●
Long-term Effectiveness and Permanence	○	●	●
Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	●
Short-term Effectiveness	○	●	●
Implementability	●	●	●
Total Cost (NPW)	No cost	$1,812,000	$5,319,000
State Acceptance	○	●	●
Community Acceptance	○	●	●

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

Threshold Criteria

Overall Protection of Human Health and the Environment. Alternative 1 alternative would not achieve the RAOs and, therefore, does not protect human health and the environment. Both Alternatives 2 and 3 would provide for effective waste containment and preclusion of potential direct human contact for current and projected future uses of the site. Further, the containment provided by Alternatives 2 and 3 would support overall protectiveness of the environment by providing a permanent barrier to weather and exposure of the waste to erosion.

Compliance with 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. Alternative 1 would not meet any ARARs. Alternatives 2 and 3 would meet all chemical-, location-, and action-specific ARARs to the extent they exist.

Primary Balancing Criteria

Long-term Effectiveness and Permanence. Alternative 1 would not have long-term effectiveness or permanence. Alternatives 2 and 3 would have long-term effectiveness and permanence because they would cover the waste to 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. Alternative 2 would not significantly change the hydrology of the site where Alternative 3 could result in significant changes in storm water runoff and methane gas management. In addition, the lower permeability cover discussed in Alternative 3 could result in changes to the aerobic/anaerobic balance, which could result in greater mobility of metals (both anthropogenic and metals naturally found in the soils at 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 in soil. Because of the type of contamination and waste in the landfill at Site 2 and its relatively low long-term risk based on current and anticipated future site use, direct treatment of soil and waste was deemed impracticable.

The Treatment and Capping alternative would reduce the mobility of arsenic and iron in the shallow aquifer at the edge of the landfill by changing the aquifer conditions to convert these contaminants to insoluble forms that would adhere to the soil matrix and not be transported by the groundwater. It would also likely reduce the concentrations of PAHs in groundwater as it should increase the aerobic degredation in the subsurface.

Short-term Effectiveness. Alternative 1 would not pose any risks to on-site workers or result in short-term adverse impact to the local community and the environment. Re-grading and handling of impacted soil under Alternatives 2 and 3 would pose short-term risks because on-site activities would involve a greater opportunity for exposure of remediation workers to contaminated soil. Dust, stormwater and erosion, noise abatement, and other construction-related issues would be addressed and control measures implemented during construction activities. Additionally, the groundwater treatment included in Alterative 3 involves chemicals which also posed limited risk to workers handling the material. The use of personal protective equipment, monitoring equipment, and observance of Occupational Safety and Health Administrative guidelines would address the worker concerns.

Implementability. Alternative 1 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.

Alternatives 2 and 3 are implementable. Re-grading and earthmoving equipment considered under these alternatives are typical in the construction industry and readily available from several local sources. However, the more robust landfill cover and injection equipment and chemicals required for the chemical oxidation injected barrier require additional materials, permits and significant additional time to implement. In addition, the monitoring program required to establish the efficacy of the chemical oxidation barrier would require significant additional effort and management with debatable additional reduction in mobility. One further potential issue is that the treatment discussed for Alternative 3 could result in significant additional methane gas generation that would require further, post-construction, abatement techniques which would add significant time and cost to the project.

Establishment of LUCs would require negotiations and agreement on the specifics of the procedures between the Navy and regulatory agencies but are equally implementable for Alternatives 2 and 3.

Cost. There would be no costs associated with the No Action alternative. The estimated present-worth cost to implement the Cover and LUC/LTM alternative is $1,812,000 and the Treatment and Capping alternative $5,319,000.

Modifying Criteria

State Acceptance. State involvement has taken place throughout the CERCLA remedy development process, including multiple discussions during NCBC Gulfport ER Partnering Team (Partnering Team) meetings. During the April 2012 Partnering Team meeting the presumptive remedy, given the proximity of the landfill to a flood plain, was discussed for Site 2. 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; the action considered the use of a 2-foot soil/vegetative cover to protect human health. The MDEQ concurred with recommending the Cover and LUC/LTM Alternative as the Preferred Alternative for Site 2.

Community Acceptance. No written questions were received during the formal public comment period for the Proposed Plan. Questions raised at the public meeting on December 2, 2014, were general inquiries for the 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.

2.12 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 2, the contaminant concentrations are not highly toxic or highly mobile; therefore, principal threat wastes are not considered to be present at the site.

2.13 SELECTED REMEDY

2.13.1 Rationale for Selected Remedy

The presumptive remedy (Alternative 2, Cover and LUC/LTM) for waste containment at military landfills was selected for Site 2 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 3 months for construction, plus additional time to prepare the necessary work plan and other administrative documents).
- The remedy would be consistent with the reasonably anticipated future use(s) of the site.
- Alternative 2 has fewer risks of remedy failure via increased contaminant mobility.
- Alternative 2 better supports a broader range of future uses due to the potential for greater landfill gas generation with Alternative 3.

2.13.2 Description of Selected Remedy

The selected remedy, Alternative 2, consists of the following three components: waste containment, LUCs, and groundwater monitoring. To complete these three components the following activities will be completed:

(1) The golf course pond on the eastern side of the site will be filled with clean fill material to a similar grade as the landfill. This fill will adequately cover waste that has been detected beneath the golf course golf course pond.

(2) Limited re-grading of the existing surface soil west of the golf course pond would be conducted to prevent ponding and promote drainage and site reuse. A minimum soil cover thickness of 2 feet over the portion of the landfill area that has either contaminated surface soil or less than 2 feet of clean soil cover would be installed. A vegetative cover consisting of native grass or other shallow-rooted vegetation suitable to minimize soil erosion where needed would be established and maintained.

(3) Groundwater monitoring will consist of collection and analysis of groundwater samples from 13 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 based on agreements made by the Navy and MDEQ. Initially, samples will be analyzed for cPAHs, arsenic, and iron. Figure 2-7 presents the groundwater monitoring well locations selected for LTM.

(4) LUCs will be established for Site 2 that clearly explain what activities are acceptable and those that are prohibited.

Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs to be implemented at Site 2 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.W

The following generally describes those LUCs that will be implemented at Site 2 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 Gulfport Base Master Plan.
- Signs will be posted advertising 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).

FIGURE 2-7. MONITORING WELL LOCATIONS

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 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.

Based on discussions between the Navy, MDEQ, and USEPA, it was agreed that the state of Mississippi would be the regulatory lead agency. The remedy for Site 2 includes a minimum 2-foot thick soil cover over remaining municipal-landfill type wastes per the state of Mississippi criteria. Based on discussions between the Navy and MDEQ, it was agreed 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 and unrestricted TRGs. The project remediation goals (PRGs) for Site 2 are presented in Table 2-5.

TABLE 2-5. PROJECT REMEDIATION GOALS

COC	PRG
Groundwater	
Arsenic	10 µg/L
Iron	1,100 µg/L
cPAHs (as BAP equivalents)	0.2 µg/L
Surface Soil	
cPAHs (as BAP equivalents)	87.5 µg/kg
Subsurface Soil	
cPAHs (as BAP equivalents)	87.5 µg/kg
NOTE: PRGs listed in this table are the MDEQ TRGs.	

Exit Strategy for Site 2 Soils: Unless the buried waste is removed and the PRGs are met for surface and subsurface soil, 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 2 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 sample 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. Groundwater monitoring is anticipated to require as long as 30 years, but may be discontinued based on analytical data trends if the Navy and other stakeholders (including the MDEQ) concur.

2.13.3 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 2. 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 2 will be achieved upon implementation of the remedy. Table 2-6 describes how the selected remedy mitigates risk and achieves RAOs for Site 2.

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 landfill/disposal area contents and surrounding subsurface soil; therefore, eliminating unacceptable human exposure scenarios for COCs in soil and landfill waste.	A minimum soil cover thickness of 2 feet over the portion of the landfill area that has less than 2 feet of clean soil 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 cPAH-contaminated surface soil	Prevent direct contact with contaminated surface soils.	Re-grade of surface soil and a minimum soil cover thickness of 2 feet over the portion of the landfill area that has contaminated surface soil will reduce areas of high toxicity.
Direct exposure to contaminants via groundwater.	Prevent direct exposure routes for human receptors for COCs in groundwater.	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 2 LUCIP.

2.14 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 with 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 2. 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 the Site 2 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 principle element of selected remedy for soil or groundwater at Site 2 because there are no principle 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 5 years after initiation of remedial action and every 5 years thereafter to ensure that the remedy is, or will be, protective of human health and the environment.

2.15 DOCUMENTATION OF SIGNIFICANT CHANGES

CERCLA Section 117(b) requires that an explanation be provided for any signification change(s) to the preferred remedy presented in the Proposed Plan that was published for public comment.

3.0 Responsiveness Summary

3.1 Stakeholder Comments and Lead Agency Responses

Participants at the public meeting held on December 2, 2014, included the general public, current RAB members, and representatives of the Navy and the MDEQ. Public participation was minimal. A court reporter captured the information discussed this meeting. The court reporter's transcript of the public meeting is included in Appendix D. Informal discussions regarding the site were held mostly between the Navy and MDEQ representatives. There were no formal questions raised at the meeting. No additional written comments, concerns, or questions were received by the Navy or MDEQ during the public comment period.

3.2 Technical and Legal Issues

No technical or legal issues with the Site 2 DD were identified.

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 2 FS
Alternative 2: Soil Cover, LUCs and Long-Term 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
1 PROJECT PLANNING											
1.1 Prepare Construction/Work Plans	140	hr			$38.00		$0	$0	$5,320	$0	$5,320
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	2	day	$1,675.00				$3,350	$0	$0	$0	$3,350
3.6 Site Superintendent	20	day		$135.00	$390.00		$0	$2,700	$7,800	$0	$10,500
3.7 Site Health & Safety and QA/QC	20	day		$135.00	$360.00		$0	$2,700	$7,200	$0	$9,900
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	1,500	gal		$0.20			$0	$300	$0	$0	$300
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 Erosion & Sediment Silt Fence	7,500	lf		$0.25	$0.35		$0	$1,875	$2,625	$0	$4,500
5.2 Front End Loader, 3 to 4.5 cy	20	day			$340.40	$541.00	$0	$0	$6,808	$10,820	$17,628
5.3 Compactor, 125 h.p. (2 each)	20	day			$340.40	$594.90	$0	$0	$6,808	$11,898	$18,706
5.4 Site Labor, (3 laborers)	30	day			$252.80		$0	$0	$7,584	$0	$7,584
5.5 Grading Layer, sand/gravel	0	cy		$8.50			$0	$0	$0	$0	$0
5.6 Off Site Soil Disposal, Non-Hazardous	0	ton	$35.00				$0	$0	$0	$0	$0
5.7 Characterization/Offsite Disposal Soil Testing	10	ea	$1,000.00	$20.00			$10,000	$200	$0	$0	$10,200
5.8 Select Fill	18,147	cy		$15.00			$0	$272,205	$0	$0	$272,205
5.9 Topsoil, loam (6 in)	0	cy		$22.42			$0	$0	$0	$0	$0
6 COVER AND SITE RESTORATION											
6.1 Upper Layer, sand/gravel	0	cy		$8.50			$0	$0	$0	$0	$0
6.2 Dozer, 140 hp (2 each)	10	day			$340.40	$682.00	$0	$0	$3,404	$6,820	$10,224
6.3 Compactor, 125 h.p. (2 each)	10	day			$340.40	$594.90	$0	$0	$3,404	$5,949	$9,353
6.4 Site Labor, (3 laborers)	10	day			$252.80		$0	$0	$2,528	$0	$2,528
5.8 Select Fill	0	cy		$15.00			$0	$1,770	$0	$0	$1,770
6.5 Topsoil, loam (6 in)	4,735	cy		$22.42			$0	$106,159	$0	$0	$106,159
6.8 Seeding Disturbed Areas	256	msf	$76.55				$19,597	$0	$0	$0	$19,597
7 MONITORING WELL INSTALLATION											
7.1 Well Installation	0	lf	$80.00				$0	$0	$0	$0	$0
7.2 Well Development	0	hr	$200.00				$0	$0	$0	$0	$0
7.3 Protective Well Casing & Apron	0	ea	$750.00				$0	$0	$0	$0	$0
7.4 Abandon Wells	0	lf	$12.50				$0	$0	$0	$0	$0
7.5 IDW Transport & Disposal, solid non-haz	0	drum	$195.00				$0	$0	$0	$0	$0
7.6 IDW Transport & Disposal, liquid non-haz	0	drum	$185.00				$0	$0	$0	$0	$0

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 2 FS
Alternative 2: Soil Cover, LUCs and Long-Term 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	80	hr			$38.00		$0	$0	$3,040	$0	$3,040
8.2 Remedial Action Closeout Report	100	hr			$38.00		$0	$0	$3,800	$0	$3,800
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							$38,497	$392,099	$69,466	$43,842	$543,904
Local Area Adjustments							100.0%	103.7%	89.6%	89.6%	
Subtotal							$38,497	$406,606	$62,242	$39,282	$546,627
Overhead on Labor Cost @ 30%									$18,672		$18,672
G & A on Labor, Material, Equipment, & Sub Cost @ 10%							$3,850	$40,661	$6,224	$3,928	$54,663
Tax on Materials and Equipment Cost @ 7%								$28,462		$2,750	$31,212
Total Direct Cost							$42,346	$475,729	$87,138	$45,960	$651,175
Indirects on Total Direct Cost @ 25%											$162,794
Profit on Total Direct Cost @ 10%											$65,117
Subtotal											$879,086
Health & Safety Monitoring @ 2%											$17,582
Total Field Cost											$896,667
Contingency on Total Field Costs @ 25%											$224,167
Engineering on Total Field Cost @ 5%											$44,833
TOTAL CAPITAL COST											**$1,165,667**

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 2 FS
Alternative 2: Soil Cover, LUCs and Long-Term 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	$2,250	$2,250	$2,250		Labor and supplies once a year to inspect Land Use Controls with Report
Cover Inspection	$3,000	$3,000	$3,000		Visit to inspect cover twice a year
Cover Maintenance	$15,000	$15,000	$15,000		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	$7,750		Labor and supplies to collect samples from wells using a crew of two.
Analysis/Water	$15,200	$7,600	$3,800		Analyze groundwater samples from 12 wells for VOCs and select 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	$20,000	$10,000	$5,000		Document sampling & results
Five Year Site Review				$23,000	Labor and supplies to evaluate site every five years for 5-year review
Subtotal	$90,450	$55,350	$36,800	$23,000	
Contingency @ 10%	$9,045	$5,535	$3,680	$2,300	
TOTAL	$99,495	$60,885	$40,480	$25,300	

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
Site 2 FS
Alternative 2: Soil Cover, LUCs and Long-Term Groundwater Monitoring
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$1,165,667		$1,165,667	1.000	$1,165,667
1		$99,495	$99,495	0.935	$93,028
2		$60,885	$60,885	0.873	$53,153
3		$60,885	$60,885	0.816	$49,682
4		$40,480	$40,480	0.763	$30,886
5		$65,780	$65,780	0.713	$46,901
6		$40,480	$40,480	0.666	$26,960
7		$40,480	$40,480	0.623	$25,219
8		$40,480	$40,480	0.582	$23,559
9		$40,480	$40,480	0.544	$22,021
10		$65,780	$65,780	0.508	$33,416
11		$40,480	$40,480	0.475	$19,228
12		$40,480	$40,480	0.444	$17,973
13		$40,480	$40,480	0.415	$16,799
14		$40,480	$40,480	0.388	$15,706
15		$65,780	$65,780	0.362	$23,812
16		$40,480	$40,480	0.339	$13,723
17		$40,480	$40,480	0.317	$12,832
18		$40,480	$40,480	0.296	$11,982
19		$40,480	$40,480	0.277	$11,213
20		$65,780	$65,780	0.258	$16,971
21		$40,480	$40,480	0.242	$9,796
22		$40,480	$40,480	0.226	$9,148
23		$40,480	$40,480	0.211	$8,541
24		$40,480	$40,480	0.197	$7,975
25		$65,780	$65,780	0.184	$12,104
26		$40,480	$40,480	0.172	$6,963
27		$40,480	$40,480	0.161	$6,517
28		$40,480	$40,480	0.15	$6,072
29		$40,480	$40,480	0.141	$5,708
30		$65,780	$65,780	0.131	$8,617
				TOTAL PRESENT WORTH	**$1,812,174**

APPENDIX B

TABLES FROM REMEDIAL INVESTIGATION REPORT

TABLE 6-14
EXPOSURE POINT CONCENTRATIONS
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Surface Soil (mg/kg)	Subsurface Soil (mg/kg)	Groundwater (µg/L)	Surface Water (µg/L)	Sediment (mg/kg)
Volatile Organic Compounds					
1,3-Dichlorobenzene	NA	NA	1.24	NA	NA
1,4-Dichlorobenzene	NA	NA	3.73	NA	NA
Chlorobenzene	NA	NA	33.1	NA	NA
Semivolatile Organic Compounds					
Acetophenone	NA	NA	NA	1.34	NA
Benzo(a)pyrene Equivalents	NA	0.012	0.11	0.14	0.016
Pesticides					
alpha-BHC	NA	NA	NA	0.012	NA
Dioxins/Furans					
2,3,7,8-TCDD Equivalents	NA	NA	0.000003	0.0000039	NA
Inorganics					
Aluminum	NA	NA	1640	NA	12,700
Arsenic	1.6	2.3	4.8	6.6	5.9
Barium	NA	NA	140	NA	NA
Chromium	4.74	5.8	6.8	1.7	14
Cobalt	NA	NA	5.2	NA	2.2
Iron	4,070	6,338	20,600	4,550	11,600
Manganese	NA	NA	190	151	NA
Nickel	NA	NA	5	NA	NA
Vanadium	NA	NA	7.8	NA	NA

Notes:
The EPCs were calculated according to the USEPA's ProUCL guidance. See the RAGS Part D Table 3s in Appendix E for details concerning the EPCs.
NA = not applicable (not a COPC for this media)

TABLE 6-15
SUMMARY OF EXPOSURE FACTORS - REASONABLE MAXIMUM EXPOSURE
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 1 OF 2

Parameter Code	Exposure Parameter	Construction/ Excavation Worker	Site Maintenance Worker	Site Industrial Worker	Adolescent Recreational User/Trespasser	Adult Recreational User/Trespasser	Future Child Resident	Future Adult Resident
All Exposures								
ED	Exposure Duration (years)	1[1]	25[2]	25[2]	11[3]	19[3]	6[4]	24[4]
BW	Body Weight (kg)	70[4]	70[4]	70[4]	45[5]	70[4]	15[4]	70[4]
AT-N	Averaging Time (Non-Cancer) (days)	365[6]	9,125[6]	9,125[6]	4,015[6]	6,935[6]	2,190[6]	8,760[6]
AT-C	Averaging Time (Cancer) (days)	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]
Incidental Ingestion/Dermal Contact with Soil and Sediment								
C_{soil}	Exposure concentration for soil (mg/kg)	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]
IR	Ingestion Rate (mg/day)	330[4]	100[4]	100[4]	100[7]	50[7]	200[4]	100[4]
FI	Fraction Ingested (unitless)	1[4]	1[4]	1[4]	1[6]	1[6]	1[4]	1[4]
SA	Skin Surface Available for Contact (cm^2)	3,300[4]	3,300[4]	3,300[4]	3,250[8]	5,700[9]	2,800[4]	5,700[4]
AF	Soil to Skin Adherence Factor (mg/cm^2/event)	0.3[4]	0.2[4]	0.2[4]	0.4[9]	0.07[9]	0.2[4]	0.07[4]
ABS	Absorption Factor (unitless)	chemical-specific[9]	chemical-specific[9]	chemical-specific[9]	chemical-specific[9]	chemical-specific[9]	chemical-specific[9]	chemical-specific[9]
CF	Conversion Factor (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
EF-Soil	Exposure Frequency Soil (days/year)	250[1]	24[10]	250[4]	30[11]	30[11]	350[4]	350[4]
EF-Sediment	Exposure Frequency Sediment (days/year)	30[1]	24[10]	24[10]	30[11]	30[11]	30[11]	30[11]
Inhalation Fugitive Dust/Volatile Emissions from Soil								
C_{air}	Exposure concentration for air (mg/m^3)	calculated[4]	calculated[4]	calculated[4]	calculated[4]	calculated[4]	calculated[4]	calculated[4]
ET	Exposure Time (hours/day)	8[1]	8[1]	8[1]	8[1]	8[1]	24[4]	24[4]
EF	Exposure Frequency (days/year)	250[1]	24[10]	250[4]	30[11]	30[11]	350[4]	350[4]
PEF	Particulate Emission Factor (m^3/kg)	1.27E+06[4]	1.36E+9[4]	1.36E+9[4]	1.36E+9[4]	1.36E+9[4]	1.36E+9[4]	1.36E+9[4]
Ingestion/Dermal Contact with Groundwater								
C_{gw}	Exposure concentration for groundwater (ug/L)	Maximum[5]	Maximum[5]	Maximum[5]	Maximum[5]	Maximum[5]	Maximum[5]	Maximum[5]
IR	Ingestion Rate (L/day)	NA	NA	NA	NA	NA	1.5[7]	2[2]
SA	Skin Surface Available for Contact (cm^2)	3,300[9]	NA	NA	NA	NA	6,600[9]	18,000[9]
ET	Exposure Time (hours/day)	4[1]	NA	NA	NA	NA	1[9]	0.58[9]
EV	Event Frequency (events/day)	1[1]	NA	NA	NA	NA	1[1]	1[1]
	Kp (cm/hour), t* (hour/event), τ (hour), and B (unitless)	chemical-specific[9]	NA	NA	NA	NA	chemical-specific[9]	chemical-specific[9]
CF	Conversion Factor (L/cm^3)	1E-03	NA	NA	NA	NA	1E-03	1E-03
EF	Exposure Frequency (days/year)	30[1]	NA	NA	NA	NA	350[9]	350[9]
Inhalation of Volatile Emissions from Groundwater								
C_{air}	Exposure concentration for air (mg/m^3)	calculated[12]	NA	NA	NA	NA	calculated[13]	calculated[13]
ET	Exposure Time (hours/day)	4[1]	NA	NA	NA	NA	24[13]	24[13]
EF	Exposure Frequency (days/year)	30[1]	NA	NA	NA	NA	350[9]	350[9]
VF	Volatilization Factor (L/m^3)	calculated[12]	NA	NA	NA	NA	0.5[13]	0.5[13]

TABLE 6-15
SUMMARY OF EXPOSURE FACTORS - REASONABLE MAXIMUM EXPOSURE
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 2 OF 2

Parameter Code	Exposure Parameter	Construction/ Excavation Worker	Site Maintenance Worker	Site Industrial Worker	Adolescent Recreational User/Trespasser	Adult Recreational User/Trespasser	Future Child Resident	Future Adult Resident
Incidental Ingestion/Dermal Contact with Surface Water								
C_{sw}	Exposure concentration for surface water (ug/L)	Maximum(14)	Maximum(14)	Maximum(14)	Maximum(14)	Maximum(14)	Maximum(14)	Maximum(14)
IR	Ingestion Rate (L/hour)	0.01(5)	0.01(5)	0.01(5)	0.01(5)	0.01(5)	0.05(5)	0.01(5)
SA	Skin Surface Available for Contact (cm^2)	3,300(9)	3,300(9)	3,300(9)	3,250(8)	5,700(9)	2,800(9)	5,700(9)
EV	Event Frequency (events/day)	1(1)	1(10)	1(1)	1(1)	1(1)	1(1)	1(1)
ET	Exposure Time (hours/day)	1(1)	1(10)	1(1)	1(1)	1(1)	1(1)	1(1)
EF	Exposure Frequency (days/year)	30(1)	24(10)	30(1)	30(11)	30(11)	30(11)	30(11)
	Kp (cm/hour), t* (hour/event), τ (hour), and B (unitless)	chemical-specific(9)	chemical-specific(9)	chemical-specific(9)	chemical-specific(9)	chemical-specific(9)	chemical-specific(9)	chemical-specific(9)

Footnotes:
1 - 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.
2 - USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
3 - Assumes a total 30 year exposure, 11 years for an adolescent (6 to 16 years old) and the remaining 19 years for an adult.
4 - USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
5 - USEPA Region 4: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. May 2000. See text.
6 - USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
7 - USEPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
8 - Assumed 25 percent of total body surface area is exposed.
9 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
10 - Assumes receptor is exposed to surface water and sediment 2 days per month.
11 - Assumes wading 2-3 days per week during summer months.
12 - VDEQ September 2004. Virginia Department of Environmental Quality (VDEQ, online -http://www.deq.state.va.us/brownfieldweb/vrp.html).
13 - USEPA, 1991:Risk Assessment Guidance for Superfund: Vo1: Part B, Development of Risk-Based Preliminary Remediation Goals.
14 - Less than ten samples were collected therefore the maximum detected concentration was used as the exposure point concentration.

TABLE 6-16
SUMMARY OF EXPOSURE FACTORS - CENTRAL TENDENCY EXPOSURE
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 1 OF 2

Parameter Code	Exposure Parameter	Construction/ Excavation Worker	Site Maintenance Worker	Site Industrial Worker	Adolescent Recreational User/Trespasser	Adult Recreational User/Trespasser	Future Child Resident	Future Adult Resident
All Exposures								
ED	Exposure Duration (years)	1[1]	9[2]	9[2]	11[3]	19[3]	2[2]	7[2]
BW	Body Weight (kg)	70[2]	70[2]	70[2]	45[4]	70[2]	15[2]	70[2]
AT-N	Averaging Time (Non-Cancer) (days)	365[5]	9,125[5]	9,125[5]	4,015[5]	6,935[5]	730[5]	2,555[5]
AT-C	Averaging Time (Cancer) (days)	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]
Incidental Ingestion/Dermal Contact with Soil and Sediment								
C_{soil}	Exposure concentration for soil (mg/kg)	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]	Maximum or 95% UCL[2]
IR	Ingestion Rate (mg/day)	165[1]	50[2]	50[2]	50[2]	50[2]	100[2]	50[2]
FI	Fraction Ingested (unitless)	1[5]	1[5]	1[5]	1[5]	1[5]	1[5]	1[5]
SA	Skin Surface Available for Contact (cm^2)	3,300[6]	3,300[6]	3,300[6]	3,250[7]	5,700[6]	2,800[6]	5,700[6]
AF	Soil to Skin Adherence Factor (mg/cm^2/event)	0.1[6]	0.02[6]	0.02[6]	0.04[6]	0.01[6]	0.04[6]	0.01[6]
ABS	Absorption Factor (unitless)	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]
CF	Conversion Factor (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
EF-Soil	Exposure Frequency Soil (days/year)	125[1]	12[8]	219[2]	15[1]	15[1]	234[2]	234[2]
EF-Sediment	Exposure Frequency Sediment (days/year)	15[1]	12[8]	12[8]	15[1]	15[1]	15[1]	15[1]
Inhalation Fugitive Dust/Volatile Emissions from Soil								
C_{air}	Exposure concentration for air (mg/m^3)	calculated[9]	calculated[9]	calculated[9]	calculated[9]	calculated[9]	calculated[9]	calculated[9]
ET	Exposure Time (hours/day)	8	8	8	8	8	24	24
EF	Exposure Frequency (days/year)	250[1]	24[8]	250[2]	15[3]	15[3]	350[2]	350[2]
PEF	Particulate Emission Factor (m^3/kg)	1.27E+06[9]	1.36E+9[9]	1.36E+9[9]	1.36E+9[9]	1.36E+9[9]	1.36E+9[9]	1.36E+9[9]
Ingestion/Dermal Contact with Groundwater								
C_{gw}	Exposure concentration for groundwater (ug/L)	Average[4]	Average[4]	Average[4]	Average[4]	Average[4]	Average[4]	Average[4]
IR	Ingestion Rate (L/day)	NA	NA	NA	NA	NA	0.66[10]	1.4[2]
SA	Skin Surface Available for Contact (cm^2)	3,300[6]	NA	NA	NA	NA	6,600[6]	18,000[6]
ET	Exposure Time (hours/day)	2[1]	NA	NA	NA	NA	0.33[6]	0.25[6]
EV	Event Frequency (events/day)	1[1]	NA	NA	NA	NA	1[1]	1[1]
	Kp (cm/hour), t* (hour/event), τ (hour), and B (unitless)	chemical-specific[6]	NA	NA	NA	NA	chemical-specific[6]	chemical-specific[6]
CF	Conversion Factor (L/cm^3)	1E-03	1E-03	NA	NA	NA	1E-03	1E-03
EF	Exposure Frequency (days/year)	15[1]	NA	NA	NA	NA	234[2]	234[2]
Inhalation of Volatile Emissions from Groundwater								
C_{air}	Exposure concentration for air (mg/m^3)	calculated[11]	NA	NA	NA	NA	calculated[12]	calculated[12]
ET	Exposure Time (hours/day)	2[1]	NA	NA	NA	NA	24	24
EF	Exposure Frequency (days/year)	15[1]	NA	NA	NA	NA	234[2]	234[2]
VF	Volatilization Factor (L/m^3)	calculated[11]	NA	NA	NA	NA	0.5[12]	0.5[12]

TABLE 6-16
SUMMARY OF EXPOSURE FACTORS - CENTRAL TENDENCY EXPOSURE
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
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Parameter Code	Exposure Parameter	Construction/ Excavation Worker	Site Maintenance Worker	Site Industrial Worker	Adolescent Recreational User/Trespasser	Adult Recreational User/Trespasser	Future Child Resident	Future Adult Resident
Incidental Ingestion/Dermal Contact with Surface Water								
C_{sw}	Exposure concentration for surface water (ug/L)	Maximum[13]	Maximum[13]	Maximum[13]	Maximum[13]	Maximum[13]	Maximum[13]	Maximum[13]
IR	Ingestion Rate (L/hour)	0.01[4]	0.01[4]	0.01[4]	0.01[4]	0.01[4]	0.05[4]	0.01[4]
SA	Skin Surface Available for Contact (cm^2)	3,300[6]	3,300[6]	3,300[6]	3,250[7]	5,700[6]	2,800[6]	5,700[6]
EV	Event Frequency (events/day)	1[1]	1[1]	1[1]	1[1]	1[1]	1[1]	1[1]
ET	Exposure Time (hours/day)	0.5[1]	0.5[1]	0.5[1]	0.5[1]	0.5[1]	0.5[1]	0.5[1]
EF	Exposure Frequency (days/year)	15[1]	12[8]	12[8]	15[1]	15[1]	15[1]	15[1]
	Kp (cm/hour), t* (hour/event), τ (hour), and B (unitless)	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]	chemical-specific[6]

Footnotes:
1 Professional Judgment. Assumes one half the RME exposure.
2 - USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
3 Assumes a total 30 year exposure, 11 years for an adolescent (6 to 16 years old) and the remaining 19 years for an adult.
4 - USEPA Region 4: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. May 2000.
5 - USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
6 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
7 - Assumed 25 percent of total body surface area is exposed.
8 - Assumes receptor is exposed to surface water and sediment one day per month.
9 - USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
10 - USEPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
11 - VDEQ September 2004. Virginia Department of Environmental Quality (VDEQ, online -http://www.deq.state.va.us/brownfieldweb/vrp.html).
12 - USEPA, 1991:Risk Assessment Guidance for Superfund: Vo1: Part B, Development of $Risk-Based Preliminary Remediation Goals.
13 - Less than ten samples were collected therefore the maximum detected concentration was used as the exposure point concentration.

TABLE 6-17
INTERMEDIATE VARIABLES FOR CALCULATING DA(EVENT)
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical of Potential Concern	Media	Dermal Absorption Fraction (soil)	FA	Kp		T(event)		Tau		T*		B
			Value	Value	Units	Value	Units	Value	Units	Value	Units	Value
Volatile Organic Compounds												
1,3-Dichlorobenzene	Groundwater	0.01	1	1.1E-02	cm/hr	(1)	hr	3.7E-01	hr	8.8E-01	hr	4.1E-02
1,4-Dichlorobenzene	Groundwater	0.01	1	3.3E-02	cm/hr	(1)	hr	9.1E-01	hr	2.2E+00	hr	1.7E-01
Chlorobenzene	Groundwater	0.01	1	7.7E-03	cm/hr	(1)	hr	3.7E-01	hr	8.9E-01	hr	2.9E-02
Semivolatile Organic Compounds												
Acetophenone	Surface Water	0.01	1	3.7E-03	cm/hr	(1)	hr	4.9E-01	NA(2)	1.2E+00	NA(2)	1.6E-02
Benzo(a)pyrene Equivalents	Soil, Groundwater, Surface Water, Sediment	0.13	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)
Pesticides												
alpha-BHC	Surface Water	0.14	1	2.0E-02	cm/hr	(1)	hr	4.5E+00	hr	1.1E+01	hr	1.3E-01
Dioxins/Furans												
2,3,7,8-TCDD Equivalents	Groundwater, Surface Water	0.03	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)	NA(2)
Inorganics												
Aluminum	Groundwater, Sediment	0.001	1	1.0E-03	cm/hr	NA	NA	NA	NA	NA	NA	NA
Arsenic	Soil, Groundwater, Surface Water, Sediment	0.03	1	1.0E-03	cm/hr	NA	NA	NA	NA	NA	NA	NA
Barium	Groundwater	0.001	1	1.0E-03	cm/hr	NA	NA	NA	NA	NA	NA	NA
Chromium	Soil, Groundwater, Surface Water, Sediment	0.001	1	2.0E-03	cm/hr	NA	NA	NA	NA	NA	NA	NA
Cobalt	Groundwater, Sediment	0.001	1	4.0E-04	cm/hr	NA	NA	NA	NA	NA	NA	NA
Iron	Soil, Groundwater, Surface Water, Sediment	0.001	1	1.0E-03	cm/hr	NA	NA	NA	NA	NA	NA	NA
Manganese	Groundwater, Surface Water	0.001	1	1.0E-03	cm/hr	NA	NA	NA	NA	NA	NA	NA
Nickel	Groundwater	0.001	1	2.0E-04	cm/hr	NA	NA	NA	NA	NA	NA	NA
Vanadium	Groundwater	0.001	1	1.0E-03	cm/hr	NA	NA	NA	NA	NA	NA	NA

Notes:
All values from EPA's Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, July 2004.
1 - See Tables x-15 and x-16 for values for Tevent.
2 - RAGS Part E recommends not attempting to quantify risk because contaminants are outside the effective predictive domain of the model.
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T(event) = Event Duration
Tau = Lag Time
T* = Time to Reach Steady-State
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
NA = Not applicable.

TABLE 6-20
NON-CANCER TOXICITY DATA - ORAL/DERMAL
SITE 2
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										
1,3-Dichlorobenzene[3]	Subchronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Liver	100	ATSDR	7/2006
	Chronic	7.0E-02	mg/kg/day	1	7.0E-02	mg/kg/day	Liver	100	ATSDR	7/2006
1,4-Dichlorobenzene	Chronic	7.0E-02	mg/kg/day	1	7.0E-02	mg/kg/day	Liver	100	ATSDR	7/2006
Chlorobenzene	Subchronic	7.0E-02	mg/kg/day	1	7.0E-02	mg/kg/day	Liver, Kidney	300	PPRTV	8/12/2006
	Chronic	2.0E-01	mg/kg/day	1	2.0E-01	mg/kg/day	Liver	1000/1	IRIS	2/24/2012
Semivolatile Organic Compounds										
Acetophenone	Chronic	1.0E-01	mg/kg/day	1	1.0E-01	mg/kg/day	None Reported	3000/1	IRIS	2/24/2012
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides										
alpha-BHC	Chronic	8.0E-03	mg/kg/day	1	8.0E-03	mg/kg/day	Liver	100	ATSDR	9/2005
Dioxins/Furans										
2,3,7,8-TCDD Equivalents	Subchronic	2.0E-08	mg/kg/day	1	2.0E-08	mg/kg/day	Lymphoma	30	ATSDR	12/1998
	Chronic	1.0E-09	mg/kg/day	1	1.0E-09	mg/kg/day	Developmental	NA	ATSDR	12/1998
Inorganics										
Aluminum	Subchronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	Central Nervous System	30	ATSDR	9/2008
	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	Central Nervous System	100	PPRTV	10/23/2006
Arsenic	Chronic	3.0E-04	mg/kg/day	0.15	4.5E-05	mg/kg/day	Skin, CVS	3/1	IRIS	2/24/2012
Barium	Subchronic	2.0E-01	mg/kg/day	0.07	1.4E-02	mg/kg/day	Kidney	300/1	ATSDR	8/2007
	Chronic	2.0E-01	mg/kg/day	0.07	1.4E-02	mg/kg/day	Kidney	300/1	IRIS	2/24/2012
Chromium[4]	Subchronic	2.0E-02	mg/kg/day	0.025	5.0E-04	mg/kg/day	None Reported	100/3	HEAST	9/97
	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	None Reported	300/3	IRIS	2/24/2012
Cobalt	Subchronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Thyroid	300/1	PPRTV	8/25/2008
	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Thyroid	3000/1	PPRTV	8/25/2008
Iron	Subchronic	7.0E-01	mg/kg/day	1	7.0E-01	mg/kg/day	Gastrointestinal System	1.5	PPRTV	9/11/2006
	Chronic	7.0E-01	mg/kg/day	1	7.0E-01	mg/kg/day	Gastrointestinal System	1.5	PPRTV	9/11/2006
Manganese[5]	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	Central Nervous System	1	IRIS	2/24/2012
Nickel	Subchronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	3001/	HEAST	7/1997
	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	2/24/2012
Vanadium	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Kidney	300	ORNL	11/2011

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 - 1,4-Dichlorobenzene is used as a surrogate for 1,3-dichlorobenzene.
4 - Values are for hexavalent chromium.
5 - Adjusted IRIS value in accordance with IRIS.

Definitions:
ATSDR = Agency for Toxic Substances and Disease Registry.
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NA = Not Available.
PPRTV = Provisional Peer Reviewed Toxicity Value.

TABLE 6-21
NON-CANCER TOXICITY DATA - INHALATION
SITE 2
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									
1,3-Dichlorobenzene[2]	Chronic	8.0E-01	mg/m3	2.3E-01	(mg/kg/day)	Liver	100/1	IRIS	2/24/2012
1,4-Dichlorobenzene	Chronic	8.0E-01	mg/m3	2.3E-01	(mg/kg/day)	Liver	100/1	IRIS	2/24/2012
Chlorobenzene	Subchronic	5.0E-01	mg/m3	1.4E-01	(mg/kg/day)	Liver, Kidney	100/1	PPRTV	8/12/2006
	Chronic	5.0E-02	mg/m3	1.4E-02	(mg/kg/day)	Liver, Kidney	1000/1	PPRTV	8/12/2006
Semivolatile Organic Compounds									
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides									
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dioxins/Furans									
2,3,7,8-TCDD Equivalents	Chronic	4.0E-08	mg/m3	1.1E-08	(mg/kg/day)	Liver, Respiratory, Developmental	NA	Cal EPA	9/2009
Inorganics									
Aluminum	Chronic	5.0E-03	mg/m3	1.4E-03	(mg/kg/day)	Central Nervous System	300/1	PPRTV	10/23/2006
Arsenic	Chronic	1.5E-05	mg/m3	4.3E-06	(mg/kg/day)	Skin, CVS	NA	Cal EPA	9/2009
Barium	Subchronic	5.0E-03	mg/m3	1.4E-03	(mg/kg/day)	Fetotoxicity	100	HEAST	7/1997
	Chronic	5.0E-04	mg/m3	1.4E-04	(mg/kg/day)	Fetotoxicity	1000	HEAST	7/1997
Chromium[3]	Chronic	1.0E-04	mg/m3	2.9E-05	(mg/kg/day)	Respiratory	300/1	IRIS	2/24/2012
Cobalt	Subchronic	2.0E-05	mg/m3	5.7E-06	(mg/kg/day)	Respiratory	100/1	PPRTV	8/25/2008
	Chronic	6.0E-06	mg/m3	1.7E-06	(mg/kg/day)	Respiratory	300/1	PPRTV	8/25/2008
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Chronic	5.0E-05	mg/m^3	1.4E-05	(mg/kg/day)	Central Nervous System	1000/1	IRIS	2/24/2012
Nickel	Subchronic	2.0E-04	mg/m^3	5.7E-05	(mg/kg/day)	Respiratory	30	ATSDR	9/2005
	Chronic	9.0E-05	mg/m^3	2.6E-05	(mg/kg/day)	Respiratory	30	ATSDR	9/2005
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

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

2 - 1,4-Dichlorobenzene is used as a surrogate for 1,3-dichlorobenzene.

3 - Values are for hexavalent chromium.

Definitions:

ATSDR = Agency for Toxic Substances and Disease Registry.

Cal EPA = California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009.

HEAST = Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NA = Not Applicable

PPRTV = Provisional Peer Reviewed Toxicity Value.

TABLE 6-22
CANCER TOXICITY DATA - ORAL/DERMAL
SITE 2
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								
1,3-Dichlorobenzene[3]	5.4E-03	$(mg/kg/day)^{-1}$	1	5.4E-03	$(mg/kg/day)^{-1}$	Not Assessed under the IRIS Program	Cal EPA	9/2009
1,4-Dichlorobenzene	5.4E-03	$(mg/kg/day)^{-1}$	1	5.4E-03	$(mg/kg/day)^{-1}$	Not Assessed under the IRIS Program	Cal EPA	9/2009
Chlorobenzene	NA	NA	NA	NA	NA	D (Not classifiable as to human carcinogenicity)	IRIS	2/24/2012
Semivolatile Organic Compounds								
Acetophenone	NA	NA	NA	NA	NA	D (Not classifiable as to human carcinogenicity)	IRIS	2/24/2012
Benzo(a)pyrene[4]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	2/24/2012
Pesticides								
alpha-BHC	6.3E+00	$(mg/kg/day)^{-1}$	1	6.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	2/24/2012
Dioxins/Furans								
2,3,7,8-TCDD Equivalents	1.3E+05	$(mg/kg/day)^{-1}$	1	1.3E+05	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Inorganics								
Aluminum	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 / human carcinogen	IRIS	2/24/2012
Barium	NA	NA	NA	NA	NA	Not likely to be carcinogenic to humans	IRIS	2/24/2012
Chromium[4,5]	5.0E-01	$(mg/kg/day)^{-1}$	0.025	2.0E+01	$(mg/kg/day)^{-1}$	Carcinogenic potential cannot be determined (Oral route)	NJDEP	4/8/2009
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	2/24/2012
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA

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 - 1,4-Dichlorobenzene is used as a surrogate for 1,3-dichlorobenzene.

4 - Carcinogenic PAHs and hexavalent chromium 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).

5 - Values are for hexavalent chromium.

Cal EPA = California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009.

IRIS = Integrated Risk Information System.

NA = Not Available.

NJDEP = New Jersey Department of Environmental Protection.

TABLE 6-23
CANCER TOXICITY DATA - INHALATION
SITE 2
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							
1,3-Dichlorobenzene[2]	1.1E-05	$(ug/m^3)^{-1}$	3.9E-02	$(mg/kg/day)^{-1}$	Not Assessed under the IRIS Program	Cal EPA	9/2009
1,4-Dichlorobenzene	1.1E-05	$(ug/m^3)^{-1}$	3.9E-02	$(mg/kg/day)^{-1}$	Not Assessed under the IRIS Program	Cal EPA	9/2009
Chlorobenzene	NA	NA	NA	NA	D (Not classifiable as to human carcinogenicity)	IRIS	2/24/2012
Semivolatile Organic Compounds							
Acetophenone	NA	NA	NA	NA	D (Not classifiable as to human carcinogenicity)	IRIS	2/24/2012
Benzo(a)pyrene[3]	1.1E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	NA	Cal EPA	9/2009
Pesticides							
alpha-BHC	1.8E-03	$(ug/m^3)^{-1}$	6.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	2/24/2012
Dioxins/Furans							
2,3,7,8-TCDD Equivalents	3.8E+01	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Inorganics							
Aluminum	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	2/24/2012
Barium	NA	NA	NA	NA	Carcinogenic potential cannot be determined	IRIS	2/24/2012
Chromium[3,4]	8.4E-02	$(ug/m^3)^{-1}$	2.9E+02	$(mg/kg/day)^{-1}$	Known/likely human carcinogen (Inhalation route)	IRIS	2/24/2012
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	NA	PPRTV	8/25/2008
Iron	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	2/24/2012
Nickel	2.6E-04	$(ug/m^3)^{-1}$	9.1E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA	9/2009
Vanadium	NA	NA	NA	NA	NA	NA	NA

Notes:
1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.
2 - 1,4-Dichlorobenzene is used as a surrogate for 1,3-dichlorobenzene.
3 - Carcinogenic PAHs and hexavalent chromium 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).
4 - Values are for hexavalent chromium.

Definitions:
IRIS = Integrated Risk Information System.
NA = Not Available.
Cal EPA = California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009.
PPRTV = Provisional Peer Reviewed Toxicity Value.

TABLE 6-24
SUMMARY OF CANCER RISKS AND HAZARD INDICES, REASONABLE MAXIMUM EXPOSURES
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Construction Workers	Surface Soil	Incidental Ingestion	2E-07	--	--	--	0.04	--
		Dermal Contact	2E-08	--	--	--	0.002	--
		Inhalation	1E-06	--	--	--	0.03	--
		Total	1E-06	--	--	--	0.07	--
	Subsurface Soil	Incidental Ingestion	3E-07	--	--	--	0.05	--
		Dermal Contact	3E-08	--	--	--	0.002	--
		Inhalation	1E-06	--	--	--	0.04	--
		Total	2E-06	--	--	--	0.10	--
	Groundwater	Dermal Contact	6E-08	--	--	--	0.005	--
		Inhalation	3E-10	--	--	--	0.00003	--
		Total	6E-08	--	--	--	0.005	--
	Surface Water	Incidental Ingestion	2E-09	--	--	--	0.0004	--
		Dermal Contact	5E-09	--	--	--	0.0007	--
		Total	7E-09	--	--	--	0.001	--
	Sediment	Incidental Ingestion	9E-08	--	--	--	0.02	--
		Dermal Contact	9E-09	--	--	--	0.0008	--
		Total	1E-07	--	--	--	0.02	--
	Total surface soil, groundwater, sediment, and surface water.		1E-06				0.09	
	Total subsurface soil, groundwater, sediment, and surface water.		2E-06				0.1	
Maintenance Workers	Surface Soil	Incidental Ingestion	2E-07	--	--	--	0.001	--
		Dermal Contact	4E-08	--	--	--	0.0001	--
		Inhalation	2E-09	--	--	--	0.000002	--
		Total	2E-07	--	--	--	0.001	--
	Subsurface Soil	Incidental Ingestion	2E-07	--	--	--	0.002	--
		Dermal Contact	5E-08	--	--	--	0.0002	--
		Inhalation	3E-09	--	--	--	0.000003	--
		Total	3E-07	--	--	--	0.002	--
	Surface Water	Incidental Ingestion	4E-08	--	--	--	0.0004	--
		Dermal Contact	1E-07	--	--	--	0.0007	--
		Total	1E-07	--	--	--	0.001	--
	Sediment	Incidental Ingestion	5E-07	--	--	--	0.006	--
		Dermal Contact	1E-07	--	--	--	0.0005	--
		Total	7E-07	--	--	--	0.006	--
	Total surface soil, sediment, and surface water.		1E-06				0.009	
	Total subsurface soil, sediment, and surface water.		1E-06				0.009	

TABLE 6-24
SUMMARY OF CANCER RISKS AND HAZARD INDICES, REASONABLE MAXIMUM EXPOSURES
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 2 OF 6

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Industrial Workers	Surface Soil	Incidental Ingestion	2E-06	--	--	--	0.01	--
		Dermal Contact	4E-07	--	--	--	0.001	--
		Inhalation	2E-08	--	--	--	0.00003	--
		Total	2E-06	--	--	Arsenic, Chromium	0.01	--
	Subsurface Soil	Incidental Ingestion	2E-06	--	--	Arsenic, Chromium	0.02	--
		Dermal Contact	5E-07	--	--	--	0.002	--
		Inhalation	3E-08	--	--	--	0.00004	--
		Total	3E-06	--	--	Arsenic, Chromium	0.02	--
	Surface Water	Incidental Ingestion	5E-08	--	--	--	0.0005	--
		Dermal Contact	1E-07	--	--	--	0.0009	--
		Total	2E-07	--	--	--	0.001	--
	Sediment	Incidental Ingestion	5E-07	--	--	--	0.006	--
		Dermal Contact	1E-07	--	--	--	0.0005	--
		Total	7E-07	--	--	--	0.006	--
	Total surface soil, sediment, and surface water.		3E-06				0.02	
	Total subsurface soil, sediment, and surface water.		4E-06				0.03	
Adolescent Recreational Users/Trespassers	Surface Soil	Incidental Ingestion	3E-07	--	--	--	0.002	--
		Dermal Contact	1E-07	--	--	--	0.0005	--
		Inhalation	4E-09	--	--	--	0.000003	--
		Total	4E-07	--	--	--	0.003	--
	Subsurface Soil	Incidental Ingestion	4E-07	--	--	--	0.003	--
		Dermal Contact	2E-07	--	--	--	0.0008	--
		Inhalation	5E-09	--	--	--	0.000004	--
		Total	5E-07	--	--	--	0.004	--
	Surface Water	Incidental Ingestion	5E-08	--	--	--	0.0007	--
		Dermal Contact	2E-07	--	--	--	0.001	--
		Total	3E-07	--	--	--	0.002	--
	Sediment	Incidental Ingestion	9E-07	--	--	--	0.01	--
		Dermal Contact	4E-07	--	--	--	0.002	--
		Total	1E-06	--	--	--	0.01	--
	Total surface soil, sediment, and surface water.		2E-06				0.02	
	Total subsurface soil, sediment, and surface water.		2E-06				0.02	

TABLE 6-24
SUMMARY OF CANCER RISKS AND HAZARD INDICES, REASONABLE MAXIMUM EXPOSURES
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
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Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Adult Recreational Users/Trespassers	Surface Soil	Incidental Ingestion	8E-08	--	--	--	0.0007	--
		Dermal Contact	3E-08	--	--	--	0.0002	--
		Inhalation	2E-09	--	--	--	0.000003	--
		Total	1E-07	--	--	--	0.0009	--
	Subsurface Soil	Incidental Ingestion	1E-07	--	--	--	0.001	--
		Dermal Contact	5E-08	--	--	--	0.0002	--
		Inhalation	3E-09	--	--	--	0.000004	--
		Total	2E-07	--	--	--	0.001	--
	Surface Water	Incidental Ingestion	4E-08	--	--	--	0.0005	--
		Dermal Contact	2E-07	--	--	--	0.002	--
		Total	2E-07	--	--	--	0.002	--
	Sediment	Incidental Ingestion	3E-07	--	--	--	0.004	--
		Dermal Contact	7E-08	--	--	--	0.0004	--
		Total	3E-07	--	--	--	0.004	--
	Total surface soil, sediment, and surface water.		6E-07				0.007	
	Total subsurface soil, sediment, and surface water.		7E-07				0.007	
Lifelong Recreational Users/Trespassers	Surface Soil	Incidental Ingestion	3E-07	--	--	--	NA	--
		Dermal Contact	2E-07	--	--	--	NA	--
		Inhalation	2E-09	--	--	--	NA	--
		Total	5E-07	--	--	--	NA	--
	Subsurface Soil	Incidental Ingestion	5E-07	--	--	--	NA	--
		Dermal Contact	2E-07	--	--	--	NA	--
		Inhalation	7E-09	--	--	--	NA	--
		Total	7E-07	--	--	--	NA	--
	Surface Water	Incidental Ingestion	9E-08	--	--	--	NA	--
		Dermal Contact	4E-07	--	--	--	NA	--
		Total	5E-07	--	--	--	NA	--
	Sediment	Incidental Ingestion	1E-06	--	--	--	NA	--
		Dermal Contact	5E-07	--	--	--	NA	--
		Total	2E-06	--	--	--	NA	--
	Total surface soil, sediment, and surface water.		3E-06				NA	
	Total subsurface soil, sediment, and surface water.		3E-06				NA	

TABLE 6-24
SUMMARY OF CANCER RISKS AND HAZARD INDICES, REASONABLE MAXIMUM EXPOSURES
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
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Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Child Residents	Surface Soil	Incidental Ingestion	2E-05	--	--	Arsenic, Chromium	0.2	--
		Dermal Contact	2E-06	--	--	Chromium	0.008	--
		Inhalation	1E-07	--	--	--	0.0001	--
		Total	2E-05	--	Chromium	Arsenic	0.2	--
	Subsurface Soil	Incidental Ingestion	2E-05	--	Chromium	Arsenic	0.2	--
		Dermal Contact	2E-06	--	--	Chromium	0.01	--
		Inhalation	2E-07	--	--	--	0.0001	--
		Total	2E-05	--	Chromium	Arsenic	0.2	--
	Groundwater - Direct Contact	Incidental Ingestion	2E-04	--	Benzo(a)pyrene Equivalents, Arsenic, Chromium	2,3,7,8-TCDD Equivalents	6	Arsenic, Iron
		Dermal Contact	5E-05	--	Chromium	--	0.2	--
		Inhalation	2E-06	--	--	1,4-Dichlorobenzene	0.3	--
		Total	3E-04	Chromium	Benzo(a)pyrene Equivalents, Arsenic	1,4-Dichlorobenzene, 2,3,7,8-TCDD Equivalents	7	Arsenic, Iron
	Groundwater - Vapor Intrusion	Inhalation	8E-08	--	--	--	0.0001	--
	Surface Water	Incidental Ingestion	5E-07	--	--	--	0.01	--
		Dermal Contact	5E-07	--	--	--	0.004	--
		Total	1E-06	--	--	--	0.01	--
	Sediment	Incidental Ingestion	4E-06	--	--	Chromium	0.07	--
		Dermal Contact	5E-07	--	--	--	0.002	--
		Total	5E-06	--	--	Chromium	0.07	--
	Total surface soil, groundwater, sediment, and surface water.		3E-04				7	
	Total subsurface soil, groundwater, sediment, and surface water.		6E-04				13	

TABLE 6-24
SUMMARY OF CANCER RISKS AND HAZARD INDICES, REASONABLE MAXIMUM EXPOSURES
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
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Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Adult Residents	Surface Soil	Incidental Ingestion	3E-06	--	--	Chromium	0.02	--
		Dermal Contact	5E-07	--	--	--	0.001	--
		Inhalation	2E-07	--	--	--	0.0001	--
		Total	4E-06	--	--	Chromium	0.02	--
	Subsurface Soil	Incidental Ingestion	4E-06	--	--	Arsenic, Chromium	0.03	--
		Dermal Contact	6E-07	--	--	--	0.002	--
		Inhalation	2E-07	--	--	--	0.0001	--
		Total	5E-06	--	--	Arsenic, Chromium	0.03	--
	Groundwater - Direct Contact	Incidental Ingestion	1E-04	--	Arsenic, Chromium	Benzo(a)pyrene Equivalents, 2,3,7,8-TCDD Equivalents	2	Target Organs HI < 1
		Dermal Contact	2E-05	--	Chromium	--	0.07	--
		Inhalation	9E-06	--	--	1,3-Dichlorobenzene, 1,4-Dichlorobenzene	0.3	--
		Total	2E-04	--	Arsenic, Chromium	1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Benzo(a)pyrene Equivalents, 2,3,7,8-TCDD Equivalents	2	Target Organs HI < 1
	Groundwater - Vapor Intrusion	Inhalation	3E-07	--	--	--	0.0001	--
	Surface Water	Incidental Ingestion	6E-08	--	--	--	0.0005	--
		Dermal Contact	3E-07	--	--	--	0.002	--
		Total	4E-07	--	--	--	0.002	--
	Sediment	Incidental Ingestion	9E-07	--	--	--	0.007	--
		Dermal Contact	1E-07	--	--	--	0.0004	--
		Total	1E-06	--	--	--	0.008	--
	Total surface soil, groundwater, sediment, and surface water.		2E-04				2	
	Total subsurface soil, groundwater, sediment, and surface water.		3E-04				4	

TABLE 6-24
SUMMARY OF CANCER RISKS AND HAZARD INDICES, REASONABLE MAXIMUM EXPOSURES
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 6 OF 6

Lifelong Residents	Surface Soil	Incidental Ingestion	2E-05	--	Chromium	Arsenic	NA	--
		Dermal Contact	2E-06	--	--	Chromium	NA	--
		Inhalation	3E-07	--	--	--	NA	--
		Total	2E-05	--	Chromium	Arsenic	NA	--
	Subsurface Soil	Incidental Ingestion	3E-05	--	Chromium	Arsenic	NA	--
		Dermal Contact	3E-06	--	--	Chromium	NA	--
		Inhalation	4E-07	--	--	--	NA	--
		Total	3E-05	--	Chromium	Arsenic	NA	--
	Groundwater - Direct Contact	Incidental Ingestion	4E-04	Chromium	Arsenic, Benzo(a)pyrene Equivalents	2,3,7,8-TCDD Equivalents	NA	--
		Dermal Contact	8E-05	--	Chromium	--	NA	--
		Inhalation	1E-05	--	--	1,3-Dichlorobenzene, 1,4-Dichlorobenzene	NA	--
		Total	5E-04	Chromium	Arsenic, Benzo(a)pyrene Equivalents	1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 2,3,7,8-TCDD Equivalents	NA	--
	Groundwater - Vapor Intrusion	Inhalation	4E-07	--	--	--	NA	--
	Surface Water	Incidental Ingestion	5E-07	--	--	--	NA	--
		Dermal Contact	8E-07	--	--	--	NA	--
		Total	1E-06	--	--	--	NA	--
	Sediment	Incidental Ingestion	5E-06	--	--	Arsenic, Chromium	NA	--
		Dermal Contact	6E-07	--	--	--	NA	--
		Total	6E-06	--	--	Arsenic, Chromium	NA	--
	Total surface soil, groundwater, sediment, and surface water.		5E-04					
	Total subsurface soil, groundwater, sediment, and surface water.		9E-04					

TABLE 6-25
SUMMARY OF CANCER RISKS AND HAZARD INDICES, CENTRAL TENDENCY EXPOSURES
SITE 2
NCBC GULFPORT
GLFPORT, MISSISSIPPI

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Construction Workers	Surface Soil	Incidental Ingestion	6E-08	--	--	--	0.009	--
		Dermal Contact	4E-09	--	--	--	0.0003	--
		Inhalation	5E-07	--	--	--	0.01	--
		Total	6E-07	--	--	--	0.02	--
	Subsurface Soil	Incidental Ingestion	7E-08	--	--	--	0.01	--
		Dermal Contact	5E-09	--	--	--	0.0004	--
		Inhalation	6E-07	--	--	--	0.02	--
		Total	7E-07	--	--	--	0.03	--
	Groundwater	Dermal Contact	2E-08	--	--	--	0.001	--
		Inhalation	8E-11	--	--	--	0.000008	--
		Total	2E-08	--	--	--	0.001	--
	Surface Water	Incidental Ingestion	1E-09	--	--	--	0.0002	--
		Dermal Contact	2E-09	--	--	--	0.0004	--
		Total	3E-09	--	--	--	0.0006	--
	Sediment	Incidental Ingestion	2E-08	--	--	--	0.005	--
		Dermal Contact	2E-09	--	--	--	0.0001	--
		Total	2E-08	--	--	--	0.005	--
	Total surface soil, groundwater, sediment, and surface water.		1E-07				0.02	
	Total subsurface soil, groundwater, sediment, and surface water.		8E-07				0.04	
Maintenance Workers	Surface Soil	Incidental Ingestion	1E-08	--	--	--	0.0003	--
		Dermal Contact	7E-10	--	--	--	0.000007	--
		Inhalation	4E-10	--	--	--	0.000001	--
		Total	2E-08	--	--	--	0.0003	--
	Subsurface Soil	Incidental Ingestion	2E-08	--	--	--	0.0004	--
		Dermal Contact	9E-10	--	--	--	0.00001	--
		Inhalation	5E-10	--	--	--	0.000002	--
		Total	2E-08	--	--	--	0.0004	--
	Surface Water	Incidental Ingestion	7E-09	--	--	--	0.0002	--
		Dermal Contact	2E-08	--	--	--	0.0004	--
		Total	2E-08	--	--	--	0.0005	--
	Sediment	Incidental Ingestion	5E-08	--	--	--	0.001	--
		Dermal Contact	2E-09	--	--	--	0.00003	--
		Total	5E-08	--	--	--	0.001	--
	Total surface soil, sediment, and surface water.		9E-08				0.002	
	Total subsurface soil, sediment, and surface water.		1E-07				0.002	

TABLE 6-25
SUMMARY OF CANCER RISKS AND HAZARD INDICES, CENTRAL TENDENCY EXPOSURES
SITE 2
NCBC GULFPORT
GLFPORT, MISSISSIPPI
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Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Industrial Workers	Surface Soil	Incidental Ingestion	3E-07	--	--	--	0.005	--
		Dermal Contact	1E-08	--	--	--	0.0001	--
		Inhalation	8E-09	--	--	--	0.00002	--
		Total	3E-07	--	--	--	0.006	--
	Subsurface Soil	Incidental Ingestion	4E-07	--	--	--	0.008	--
		Dermal Contact	2E-08	--	--	--	0.0002	--
		Inhalation	9E-09	--	--	--	0.00003	--
		Total	4E-07	--	--	--	0.008	--
	Surface Water	Incidental Ingestion	7E-09	--	--	--	0.0002	--
		Dermal Contact	2E-08	--	--	--	0.0004	--
		Total	2E-08	--	--	--	0.0005	--
	Sediment	Incidental Ingestion	5E-08	--	--	--	0.001	--
		Dermal Contact	2E-09	--	--	--	0.00003	--
		Total	5E-08	--	--	--	0.001	--
	Total surface soil, sediment, and surface water.		4E-07				0.008	
	Total subsurface soil, sediment, and surface water.		5E-07				0.01	
Adolescent Recreational Users/Trespassers	Surface Soil	Incidental Ingestion	7E-08	--	--	--	0.0006	--
		Dermal Contact	7E-08	--	--	--	0.0003	--
		Inhalation	2E-09	--	--	--	0.000002	--
		Total	1E-07	--	--	--	0.0009	--
	Subsurface Soil	Incidental Ingestion	9E-08	--	--	--	0.0009	--
		Dermal Contact	9E-08	--	--	--	0.0004	--
		Inhalation	2E-09	--	--	--	0.000002	--
		Total	2E-07	--	--	--	0.001	--
	Surface Water	Incidental Ingestion	2E-08	--	--	--	0.0004	--
		Dermal Contact	1E-07	--	--	--	0.0007	--
		Total	1E-07	--	--	--	0.001	--
	Sediment	Incidental Ingestion	4E-07	--	--	--	0.006	--
		Dermal Contact	2E-07	--	--	--	0.001	--
		Total	6E-07	--	--	--	0.007	--
	Total surface soil, sediment, and surface water.		9E-07				0.008	
	Total subsurface soil, sediment, and surface water.		1E-06				0.009	

TABLE 6-25
SUMMARY OF CANCER RISKS AND HAZARD INDICES, CENTRAL TENDENCY EXPOSURES
SITE 2
NCBC GULFPORT
GLFPORT, MISSISSIPPI
PAGE 3 OF 6

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Adult Recreational Users/Trespassers	Surface Soil	Incidental Ingestion	4E-08	--	--	--	0.0004	--
		Dermal Contact	2E-09	--	--	--	0.000008	--
		Inhalation	1E-10	--	--	--	0.0000002	--
		Total	4E-08	--	--	--	0.0004	--
	Subsurface Soil	Incidental Ingestion	5E-08	--	--	--	0.0005	--
		Dermal Contact	2E-09	--	--	--	0.00001	--
		Inhalation	2E-10	--	--	--	0.0000003	--
		Total	5E-08	--	--	--	0.0006	--
	Surface Water	Incidental Ingestion	2E-08	--	--	--	0.0002	--
		Dermal Contact	8E-08	--	--	--	0.0008	--
		Total	1E-07	--	--	--	0.001	--
	Sediment	Incidental Ingestion	1E-07	--	--	--	0.002	--
		Dermal Contact	5E-09	--	--	--	0.00003	--
		Total	1E-07	--	--	--	0.002	--
	Total surface soil, sediment, and surface water.		3E-07				0.003	
	Total subsurface soil, sediment, and surface water.		3E-07				0.003	
Lifelong Recreational Users/Trespassers	Surface Soil	Incidental Ingestion	1E-07	--	--	--	NA	--
		Dermal Contact	7E-08	--	--	--	NA	--
		Inhalation	2E-09	--	--	--	NA	--
		Total	2E-07	--	--	--	NA	--
	Subsurface Soil	Incidental Ingestion	1E-07	--	--	--	NA	--
		Dermal Contact	9E-08	--	--	--	NA	--
		Inhalation	2E-09	--	--	--	NA	--
		Total	2E-07	--	--	--	NA	--
	Surface Water	Incidental Ingestion	4E-08	--	--	--	NA	--
		Dermal Contact	2E-07	--	--	--	NA	--
		Total	2E-07	--	--	--	NA	--
	Sediment	Incidental Ingestion	6E-07	--	--	--	NA	--
		Dermal Contact	2E-07	--	--	--	NA	--
		Total	8E-07	--	--	--	NA	--
	Total surface soil, sediment, and surface water.		1E-06				NA	
	Total subsurface soil, sediment, and surface water.		2E-06				NA	

TABLE 6-25
SUMMARY OF CANCER RISKS AND HAZARD INDICES, CENTRAL TENDENCY EXPOSURES
SITE 2
NCBC GULFPORT
GLFPORT, MISSISSIPPI
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Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Child Residents	Surface Soil	Incidental Ingestion	2E-06	--	--	Chromium	0.05	--
		Dermal Contact	9E-08	--	--	--	0.001	--
		Inhalation	3E-08	--	--	--	0.00007	--
		Total	2E-06	--	--	Chromium	0.06	--
	Subsurface Soil	Incidental Ingestion	3E-06	--	--	Chromium	0.08	--
		Dermal Contact	1E-07	--	--	--	0.002	--
		Inhalation	4E-08	--	--	--	0.0001	--
		Total	3E-06	--	--	Chromium	0.08	--
	Groundwater - Direct Contact	Incidental Ingestion	3E-05	--	Chromium	Benzo(a)pyrene Equivalents, Arsenic	2	Target Organ HI < 1
		Dermal Contact	5E-06	--	--	Chromium	0.04	--
		Inhalation	5E-07	--	--	--	0.2	--
		Total	3E-05	--	Chromium	Benzo(a)pyrene Equivalents, Arsenic	2	Target Organ HI < 1
	Groundwater - Vapor Intrusion	Inhalation	8E-08	--	--	--	0.0001	--
	Surface Water	Incidental Ingestion	9E-08	--	--	--	0.01	--
		Dermal Contact	1E-07	--	--	--	0.004	--
		Total	2E-07	--	--	--	0.01	--
	Sediment	Incidental Ingestion	4E-07	--	--	--	0.03	--
		Dermal Contact	2E-08	--	--	--	0.0005	--
		Total	5E-07	--	--	--	0.03	--
	Total surface soil, groundwater, sediment, and surface water.		4E-05				2	
	Total subsurface soil, groundwater, sediment, and surface water.		6E-05				4	

TABLE 6-25
SUMMARY OF CANCER RISKS AND HAZARD INDICES, CENTRAL TENDENCY EXPOSURES
SITE 2
NCBC GULFPORT
GLFPORT, MISSISSIPPI
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Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Adult Residents	Surface Soil	Incidental Ingestion	3E-07	--	--	--	0.006	--
		Dermal Contact	1E-08	--	--	--	0.0001	--
		Inhalation	3E-08	--	--	--	0.00007	--
		Total	3E-07	--	--	--	0.006	--
	Subsurface Soil	Incidental Ingestion	4E-07	--	--	--	0.009	--
		Dermal Contact	2E-08	--	--	--	0.0002	--
		Inhalation	4E-08	--	--	--	0.0001	--
		Total	4E-07	--	--	--	0.009	--
	Groundwater - Direct Contact	Incidental Ingestion	3E-05	--	--	Benzo(a)pyrene Equivalents, Arsenic, Chromium	1	--
		Dermal Contact	3E-06	--	--	Chromium	0.03	--
		Inhalation	2E-06	--	--	--	0.2	--
		Total	3E-05	--	--	Benzo(a)pyrene Equivalents, Arsenic, Chromium	1	--
	Groundwater - Vapor Intrusion	Inhalation	3E-07	--	--	--	0.0001	--
	Surface Water	Incidental Ingestion	8E-09	--	--	--	0.0002	--
		Dermal Contact	4E-08	--	--	--	0.0005	--
		Total	5E-08	--	--	--	0.0007	--
	Sediment	Incidental Ingestion	6E-08	--	--	--	0.001	--
		Dermal Contact	2E-09	--	--	--	0.00002	--
		Total	6E-08	--	--	--	0.001	--
	Total surface soil, groundwater, sediment, and surface water.		3E-05				1	
	Total subsurface soil, groundwater, sediment, and surface water.		6E-05				3	

TABLE 6-25
SUMMARY OF CANCER RISKS AND HAZARD INDICES, CENTRAL TENDENCY EXPOSURES
SITE 2
NCBC GULFPORT
GLFPORT, MISSISSIPPI
PAGE 6 OF 6

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks ≥ 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Lifelong Residents	Surface Soil	Incidental Ingestion	2E-06	--	--	Chromium	NA	--
		Dermal Contact	1E-07	--	--	--	NA	--
		Inhalation	6E-08	--	--	--	NA	--
		Total	3E-06	--	--	Chromium	NA	--
	Subsurface Soil	Incidental Ingestion	3E-06	--	--	Chromium	NA	--
		Dermal Contact	1E-07	--	--	--	NA	--
		Inhalation	8E-08	--	--	--	NA	--
		Total	3E-06	--	--	Chromium	NA	--
	Groundwater - Direct Contact	Incidental Ingestion	6E-05	--	Arsenic, Chromium	Benzo(a)pyrene Equivalents	NA	--
		Dermal Contact	7E-06	--	--	Chromium	NA	--
		Inhalation	2E-06	--	--	1,4-Dichlorobenzene	NA	--
		Total	7E-05	--	Arsenic, Chromium	Benzo(a)pyrene Equivalents, 1,4-Dichlorobenzene	NA	--
	Groundwater - Vapor Intrusion	Inhalation	4E-07	--	--	--	NA	--
	Surface Water	Incidental Ingestion	1E-07	--	--	--	NA	--
		Dermal Contact	1E-07	--	--	--	NA	--
		Total	2E-07	--	--	--	NA	--
	Sediment	Incidental Ingestion	5E-07	--	--	--	NA	--
		Dermal Contact	2E-08	--	--	--	NA	--
		Total	5E-07	--	--	--	NA	--
	Total surface soil, groundwater, sediment, and surface water.		7E-05					
	Total subsurface soil, groundwater, sediment, and surface water.		1E-04					

TABLE 7-1
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 1 OF 3

Chemical	Frequency of Detection	Range of Detected		Location of Maximum Detected Concentration	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Dioxins/Furans (ng/kg)									
TCDD TEQ (mammal)[5]	1/1	0.79474	0.7947	02SB10	-	-	NA	NA	Yes
TCDD TEQ (bird)[5]	1/1	0.81808	0.8181	02SB10	-	-	NA	NA	Yes
TCDD TEQ (fish)[5]	1/1	0.75758	0.7576	02SB10	-	-	NA	NA	Yes
Metals (mg/kg)									
ALUMINUM	5/5	2470	4990	02SB13	-	-	50	99.8	Yes
ARSENIC	5/5	0.712	1.6	02SB10	-	-	18	0.1	No
BARIUM	5/5	8.61	90.7	02SB10	-	-	330	0.3	No
BERYLLIUM	5/5	0.0921	0.2	02SB11	-	-	21	0.01	No
CADMIUM	5/5	0.0648	0.0851	02SB13	0.101	0.112	0.36	0.2	No
CALCIUM	5/5	284	726	02SB11	-	-	NA	NA	No
CHROMIUM	5/5	2.7	4.92	02SB13	-	-	26	0.2	No
COBALT	4/5	0.304	0.537	02SB10	0.536	0.536	13	0.04	No
COPPER	5/5	0.959	2.44	02SB07	-	-	28	0.1	No
IRON	5/5	1350	4240	02SB07	-	-	200	21.2	Yes
LEAD	5/5	5.95	10.4	02SB11	-	-	11	0.9	No
MAGNESIUM	5/5	67.8	144	02SB07	-	-	NA	NA	No
MANGANESE	5/5	2.37	5.13	02SB11	-	-	220	0.02	No
MERCURY	5/5	0.0269	0.0545	02SB12	-	-	0.1	0.5	No
NICKEL	5/5	0.732	1.36	02SB07	-	-	38	0.04	No
POTASSIUM	3/5	63.4	147	02SB07	156	168	NA	NA	No
SELENIUM	5/5	0.221	0.421	02SB11	-	-	0.52	0.8	No
VANADIUM	5/5	3.61	7.14	02SB07	-	-	7.8	0.9	No
ZINC	5/5	6.9	14.9	02SB13	-	-	46	0.3	No

TABLE 7-1
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 2 OF 3

Chemical	Frequency of Detection	Range of Detected		Location of Maximum Detected Concentration	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Volatile Organic Compounds (µg/kg)									
2-BUTANONE	5/5	3.24	6.57	02SB10	5.6	5.6	NA	NA	Yes
ACETONE	5/5	27.9	189	02SB13	-	-	NA	NA	Yes
METHYLENE CHLORIDE	4/5	3.86	5.24	02SB10	5.36	5.36	2000	0.003	No
Polynuclear Aromatic Hydrocarbons (µg/kg)									
ACENAPHTHENE	4/5	1.75	2.36	02SB07	3.5	3.59	29000	0.0001	No
BENZO(B)FLUORANTHENE	4/5	3.14	11.4	02SB13	3.35	3.35	1100	0.01	No
BENZO(G,H,I)PERYLENE	1/5	3.24	3.24	02SB10	3.35	3.59	1100	0.003	No
CHRYSENE	1/5	7.07	7.07	02SB13	3.35	3.59	1100	0.01	No
DIBENZO(A,H)ANTHRACENE	1/5	3.19	3.19	02SB13	3.35	3.59	1100	0.003	No
FLUORANTHENE	5/5	3.33	8.18	02SB13	-	-	29000	0.0003	No
INDENO(1,2,3-CD)PYRENE	1/5	2.7	2.7	02SB07	3.35	3.59	1100	0.002	No
PYRENE	3/5	4.31	6.91	02SB13	3.35	3.37	1100	0.01	No
TOTAL PAHs[6]	5/5	31.07	60.91	02SB13	-	-	1000	0.1	No
Pesticides (µg/kg)									
4,4'-DDD	1/5	0.487	0.487	02SB07	0.349	0.367	21	0.02	No
4,4'-DDE	3/5	0.271	1.15	02SB07	0.349	0.357	21	0.1	No
4,4'-DDT	3/5	0.29575	0.524	02SB07	0.349	0.367	21	0.02	No
TOTAL DDT[7]	5/5	0.524	2.161	02SB07	-	-	21	0.1	No
ALPHA-CHLORDANE	4/5	0.428	1.26	02SB11	0.34	0.355	100[8]	0.01	No
GAMMA-CHLORDANE	3/5	0.131	0.636	02SB13	0.349	0.357	100[8]	0.01	No
DIELDRIN	5/5	0.242	0.449	02SB11	0.355	0.355	4.9	0.1	No
ENDOSULFAN I	1/5	0.213	0.213	02SB11	0.34	0.367	100[8]	0.002	No
ENDOSULFAN SULFATE	2/5	0.298	0.579	02SB11	0.34	0.357	100[8]	0.01	No
ENDRIN KETONE	2/5	1.23	2.71	02SB10	0.34	0.367	1[9]	2.7	Yes

TABLE 7-1
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 3 OF 3

Chemical	Frequency of Detection	Range of Detected		Location of Maximum Detected Concentration	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Pesticides (µg/kg)									
GAMMA-BHC (LINDANE)	2/5	0.158	0.247	02SB11	0.34	0.357	0.05	4.9	Yes
METHOXYCHLOR	3/5	0.292	0.726	02SB13	0.34	0.367	100[8]	0.01	No

Notes:
(1) Sample-specific detection limits
(2) Ecological screening values are from USEPA (2001b) and USEPA Ecological Soil Screening Level (Eco-SSL) documents.
(3) Hazard quotient (HQ) = maximum detected concentration ÷ ecological screening value.
(4) 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, except that calcium, magnesium, and potassium are nutrients that were not considered to be COPCs.
(5) 2,3,7,8-TCDD toxic equivalent concentrations were calculated using one-half the detection limit for non-detected congeners.
(6) Total polynuclear aromatic hydrocarbons (PAHs) = the sum of PAHs using one-half the detection limit for non-detected isomers.
(7) Total DDT = the sum of DDD, DDE, and DDT isomers using one-half the detection limit for non-detected isomers.
(8) Ecological screening value for organochlorinated pesticides (USEPA, 2001b)
(9) 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 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 1 OF 2

Chemical	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Dioxins/Furans (pg/L)									
TCDD TEQ (mammal)[5]	2/2	3.10944	3.95731	02SW/SD06	-	-	10	0.4	No
TCDD TEQ (bird)[5]	2/2	3.84003	5.70444	02SW/SD06	-	-	10	0.6	No
TCDD TEQ (fish)[5]	2/2	3.15865	3.86394	02SW/SD06	-	-	10	0.4	No
Metals (µg/L)									
ALUMINUM	6/6	59.3	1520	02SW/SD05	-	-	87	17.5	Yes
ARSENIC	6/6	3.79	8.59	02SW/SD05	-	-	190	0.05	No
BARIUM	6/6	12.4	62	02SW/SD05	-	-	NA	NA	Yes
CALCIUM	6/6	13100	64500	02SW/SD06	-	-	NA	NA	No
CHROMIUM	3/6	0.666	2.37	02SW/SD05	1	1	11	0.2	No
COPPER	2/6	1.06	2.53	02SW/SD05	2	2	10.2[6]	0.2	No
IRON	6/6	955	6190	02SW/SD05	-	-	1000	6.2	Yes
MAGNESIUM	6/6	1980	4140	02SW/SD06	-	-	NA	NA	No
MANGANESE	6/6	26.3	151	02SW/SD05	-	-	NA	NA	Yes
MERCURY	6/6	0.0944	0.15	02SW/SD02	-	-	0.012	12.5	Yes
NICKEL	1/6	1.44	1.44	02SW/SD05	1.5	1.5	136.5[6]	0.01	No
POTASSIUM	6/6	798	4560	02SW/SD01	-	-	NA	NA	No
SODIUM	6/6	3400	12000	02SW/SD06	-	-	NA	NA	No
VANADIUM	4/6	1.31	4.04	02SW/SD05	2.5	2.5	NA	NA	Yes
ZINC	6/6	2	24.8	02SW/SD05	-	-	91.7[6]	0.3	No
Semivolatile Organic Compounds (µg/L)									
ACETOPHENONE	1/6	1.34	1.34	02SW/SD04	2.31	2.34	NA	NA	Yes
Volatile Organic Compounds (µgL)									
ACETONE	6/6	3.52	5.86	02SW/SD04	-	-	NA	NA	Yes
Polynuclear Aromatic Hydrocarbons (µg/L)									
2-METHYLNAPHTHALENE	3/6	0.0533	0.0644	02SW/SD01	0.0926	0.0926	NA	NA	Yes
ANTHRACENE	6/6	0.0745	0.231	02SW/SD02	-	-	NA	NA	Yes
BENZO(A)ANTHRACENE	2/6	0.0594	0.0671	02SW/SD02	0.0926	0.0935	NA	NA	Yes

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

Chemical	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Polynuclear Aromatic Hydrocarbons (µg/L)									
BENZO(A)PYRENE	1/6	0.0634	0.0634	02SW/SD02	0.0926	0.0935	NA	NA	Yes
BENZO(B)FLUORANTHENE	1/6	0.0788	0.0788	02SW/SD02	0.0926	0.0935	NA	NA	Yes
BENZO(G,H,I)PERYLENE	1/6	0.071	0.071	02SW/SD02	0.0926	0.0935	NA	NA	Yes
BENZO(K)FLUORANTHENE	1/6	0.0762	0.0762	02SW/SD02	0.0926	0.0935	NA	NA	Yes
CHRYSENE	2/6	0.0576	0.0701	02SW/SD02	0.0926	0.0935	NA	NA	Yes
DIBENZO(A,H)ANTHRACENE	1/6	0.0851	0.0851	02SW/SD02	0.0926	0.0935	NA	NA	Yes
FLUORANTHENE	1/6	0.291	0.291	02SW/SD02	0.103	0.223	39.8	0.01	No
INDENO(1,2,3-CD)PYRENE	1/6	0.0862	0.0862	02SW/SD02	0.0926	0.0935	NA	NA	Yes
PYRENE	6/6	0.0678	0.217	02SW/SD02	-	-	NA	NA	Yes
Pesticides (µg/L)									
ALPHA-BHC	4/6	0.00654	0.0224	02SW/SD01	0.0093	0.0093	500	0.00004	No
BETA-BHC	4/6	0.00534	0.0173	02SW/SD01	0.0093	0.0093	5000	0.000003	No
ALPHA-CHLORDANE	1/6	0.00395	0.00395	02SW/SD05	0.0093	0.0093	0.0043	0.9	No
ENDOSULFAN II	2/6	0.0106	0.0129	02SW/SD06	0.0093	0.0093	0.056	0.2	No
ENDRIN KETONE	1/6	0.0144	0.0144	02SW/SD01	0.0093	0.0093	0.0023[7]	6.3	Yes

Notes:

(1) Sample-specific detection limits

(2) Ecological screening values are from USEPA (2001b).

(3) Hazard quotient (HQ) = maximum detected concentration ÷ ecological screening value.

(4) 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, except that calcium, magnesium, potassium, and sodium are nutrients that were not considered to be COPCs.

(5) 2,3,7,8-TCDD toxic equivalent concentrations were calculated using one-half the detection limit for non-detected congeners.

(6) Based on average site-specific hardness in of 84.3 mg/L.

(7) Ecological screening value for endrin.

NA = Ecological screening value not available.

TABLE 7-3
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SEDIMENT
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 1 OF 3

Chemical	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Dioxins/Furans (ng/kg)									
TCDD TEQ (mammal)[5]	2/2	0.3708	2.38265	02SW/SD02	-	-	2.5	0.95	No
TCDD TEQ (bird)[5]	2/2	0.37205	1.55335	02SW/SD02	-	-	2.5	0.6	No
TCDD TEQ (fish)[5]	2/2	0.31555	1.17362	02SW/SD02	-	-	2.5	0.5	No
Metals (mg/kg)									
ALUMINUM	6/6	975	16000	02SW/SD04	-	-	NA	NA	Yes
ARSENIC	6/6	0.562	7.28	02SW/SD04	-	-	7.24	1.01	Yes
BARIUM	6/6	5.35	52.4	02SW/SD04	-	-	NA	NA	Yes
BERYLLIUM	6/6	0.0618	0.448	02SW/SD04	0.128	0.128	NA	NA	Yes
CADMIUM	3/6	0.221	0.423	02SW/SD04	0.122	0.144	1	0.4	No
CALCIUM	6/6	157	2310	02SW/SD04	-	-	NA	NA	No
CHROMIUM	6/6	1.93	17.1	02SW/SD04	-	-	52.3	0.3	No
COBALT	5/6	0.398	2.72	02SW/SD04	0.656	0.656	NA	NA	Yes
COPPER	6/6	0.576	34.6	02SW/SD04	-	-	18.7	1.9	Yes
IRON	6/6	916	14000	02SW/SD04	-	-	NA	NA	Yes
LEAD	6/6	3.56	93.4	02SW/SD04	-	-	30.2	3.1	Yes
MAGNESIUM	5/6	182	864	02SW/SD04	197	197	NA	NA	No
MANGANESE	6/6	2.22	42.1	02SW/SD06	-	-	NA	NA	Yes
MERCURY	6/6	0.0193	0.291	02SW/SD04	-	-	0.13	2.2	Yes
NICKEL	6/6	0.572	7	02SW/SD04	-	-	15.9	0.4	No
POTASSIUM	4/6	93.7	390	02SW/SD04	183	197	NA	NA	No
SELENIUM	5/6	0.212	0.996	02SW/SD04	0.321	0.328	NA	NA	Yes
SILVER	2/6	0.126	0.231	02SW/SD04	0.122	0.144	2	0.1	No
VANADIUM	6/6	2.69	26.5	02SW/SD04	-	-	NA	NA	Yes
ZINC	6/6	6.04	153	02SW/SD04	-	-	124	1.2	Yes
Volatile Organic Compounds (µg/kg)									
2-BUTANONE	4/6	4.3	12.5	02SW/SD04	6.48	7.17	NA	NA	Yes
ACETONE	6/6	7.48	361	02SW/SD04	-	-	NA	NA	Yes

TABLE 7-3
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SEDIMENT
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 2 OF 3

Chemical	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Polynuclear Aromatic Hydrocarbons (µg/kg)									
2-METHYLNAPHTHALENE	2/6	6.48	7.66	02SW/SD02	4.07	8.85	330	0.02	No
ACENAPHTHENE	3/6	2.41	6.12	02SW/SD03	4.07	8.85	330	0.02	No
ACENAPHTHYLENE	1/6	2.34	2.34	02SW/SD06	4.09	8.85	330	0.01	No
ANTHRACENE	2/6	3.31	3.92	02SW/SD01	4.09	8.85	330	0.01	No
BENZO(A)ANTHRACENE	1/6	7.67	13.2	02SW/SD01	4.07	8.85	330	0.04	No
BENZO(A)PYRENE	2/6	10.47	18.8	02SW/SD01	4.09	8.85	330	0.1	No
BENZO(B)FLUORANTHENE	5/6	5.99	37.4	02SW/SD03	4.28	8.85	NA	NA	Yes
BENZO(G,H,I)PERYLENE	3/6	7.07	14.7	02SW/SD06	4.09	8.85	NA	NA	Yes
BENZO(K)FLUORANTHENE	5/6	2.95	11.5	02SW/SD03	4.28	8.85	NA	NA	Yes
CHRYSENE	1/6	8.47	14.8	02SW/SD01	4.07	8.85	330	0.04	No
FLUORANTHENE	5/6	6.76	30.6	02SW/SD03	8.85	8.85	330	0.1	No
FLUORENE	2/6	3.64	11.6	02SW/SD02	4.07	8.85	330	0.04	No
INDENO(1,2,3-CD)PYRENE	1/6	5.345	8.55	02SW/SD01	4.07	8.85	NA	NA	Yes
NAPHTHALENE	1/6	11.8	11.8	02SW/SD02	4.07	8.85	330	0.04	No
PHENANTHRENE	2/6	24.9	38.4	02SW/SD03	9.48	17	330	0.1	No
PYRENE	5/6	5.7	26	02SW/SD03	8.85	8.85	330	0.1	No
TOTAL PAHs[6]	6/6	47	191	02SW/SD03	-	-	1684	0.1	No
Pesticides (µg/kg)									
4,4'-DDD	3/6	0.236	3.7	02SW/SD02	0.426	0.886	3.3	1.1	Yes
4,4'-DDE	6/6	0.486	5.25	02SW/SD02	-	-	3.3	1.6	Yes
4,4'-DDT	1/6	3.66	3.66	02SW/SD02	0.413	0.886	3.3	1.1	Yes
TOTAL DDT[7]	6/6	0.912	12.61	02SW/SD02	-	-	3.3	3.8	Yes
ALDRIN	1/6	0.544	0.544	02SW/SD06	0.418	0.886	NA	NA	Yes
ALPHA-BHC	4/6	0.442	1.99	02SW/SD03	0.426	0.456	NA	NA	Yes
BETA-BHC	1/6	0.789	0.789	02SW/SD05	0.413	0.886	NA	NA	Yes
DELTA-BHC	3/6	0.35	1.69	02SW/SD04	0.413	0.456	NA	NA	Yes
GAMMA-BHC (LINDANE)	1/6	0.365	0.365	02SW/SD04	0.413	0.722	3.3	0.1	No

TABLE 7-3
SELECTION OF ECOLOGICAL CHEMICALS OF POTENTIAL CONCERN IN SEDIMENT
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI
PAGE 3 OF 3

Chemical	Frequency of Detection	Range of Detected Concentrations		Location of Maximum Detected Concentration	Range of Nondetects[1]		ESV[2]	HQ[3]	COPC (Yes/No)[4]
		Min	Max		Min	Max			
Pesticides (µg/kg)									
ALPHA-CHLORDANE	3/6	1.36	3.6	02SW/SD06	0.426	0.886	1.7	2.1	Yes
GAMMA-CHLORDANE	6/6	1.31	5.37	02SW/SD06	-	-	1.7	3.2	Yes
HEPTACHLOR	1/6	0.453	0.453	02SW/SD05	0.413	0.886	NA	NA	Yes
HEPTACHLOR EPOXIDE	1/6	0.815	0.815	02SW/SD05	0.413	0.886	NA	NA	Yes

Notes:

(1) Sample-specific detection limits

(2) Ecological screening values are from USEPA (2001b).

(3) Hazard quotient (HQ) = maximum detected concentration ÷ ecological screening value.

(4) 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, except that calcium, magnesium, and potassium are nutrients that were not considered to be COPCs.

(5) 2,3,7,8-TCDD toxic equivalent concentrations were calculated using one-half the detection limit for non-detected congeners.

(6) Total polynuclear aromatic hydrocarbons (PAHs) = the sum of PAHs using one-half the detection limit for non-detected compounds.

(7) Total DDT = the sum of DDD, DDE, and DDT isomers using one-half the detection limit for non-detected compounds.

NA = Ecological screening value not available.

gamma-chlordane, heptachlor, and heptachlor epoxide in sediment. Potential risks to piscivorous birds and piscivorous mammals were evaluated for these 19 COPCs.

Based on maximum concentrations and conservative assumptions, food chain NOAEL HQs exceeded 1.0 for arsenic, copper, lead, mercury, and zinc (see Table 7-6). Food chain HQs in the conservative scenario were less than 1.0 for all other COPCs. NOAEL-based HQs were highest for mercury, with an HQ of 23.2 for the green heron and 4.5 for the mink.

In the average concentration scenario, mercury was the only COPC with a NOAEL-based HQ greater than 1.0 (see Table 7-7). All HQs based on lowest-observed adverse effects levels (LOAELs) were less than 1.0 in the average scenario.

TABLE 7-4
FOOD CHAIN MODEL – ECOLOGICAL HAZARD QUOTIENTS
CONSERVATIVE SCENARIO, INSECTIVOROUS RECEPTORS
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Insectivorous Receptor HQs			
	Robin		Short-Tailed Shrew	
	NOAEL	LOAEL	NOAEL	LOAEL
Pesticides/PCBs				
Endrin Ketone	0.2	0.02	0.01	0.001
Gamma BHC (Lindane)	0.0001	0.00001	0.00002	0.000002
Dioxins/Furans				
TCDD TEQ	0.2	0.02	1.9	0.2

Notes:
Cells are shaded if the value is greater than 1.0.

TABLE 7-5
FOOD CHAIN MODEL – ECOLOGICAL HAZARD QUOTIENTS
AVERAGE SCENARIO, INSECTIVOROUS RECEPTORS
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Insectivorous Receptor HQs			
	Robin		Short-Tailed Shrew	
	NOAEL	LOAEL	NOAEL	LOAEL
Pesticides/PCBs				
Endrin Ketone	0.03	0.003	0.002	0.0002
Gamma BHC (Lindane)	0.0001	0.00001	0.00001	0.000001
Dioxins/Furans				
TCDD TEQ	0.1	0.01	0.8	0.1

TABLE 7-6
FOOD CHAIN MODEL – ECOLOGICAL HAZARD QUOTIENTS
CONSERVATIVE SCENARIO, PISCIVOROUS RECEPTORS
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Insectivorous Receptor HQs			
	Green Heron		Mink	
	NOAEL	LOAEL	NOAEL	LOAEL
Pesticides/PCBs				
4,4'-DDD	0.01	0.001	0.01	0.0003
4,4'-DDE	0.3	0.03	0.4	0.01
4,4'-DDT	0.1	0.004	0.1	0.002
Total DDT	0.8	0.07	0.98	0.03
Aldrin	NA	NA	0.007	0.001
Alpha-Chlordane	0.01	0.003	0.006	0.003
Gamma-Chlordane	0.01	0.002	0.004	0.002
Alpha BHC	0.01	0.003	0.4	0.04
Beta BHC	0.005	0.001	0.001	0.0001
Delta BHC	0.01	0.003	0.3	0.03
Endrin Ketone	0.0002	0.00002	0.00004	0.000
Heptachlor	NA	NA	0.01	0.001
Heptachlor Epoxide	NA	NA	0.02	0.002
Inorganics				
Arsenic	0.4	0.2	0.7	0.2
Copper	7.0	0.8	4.1	0.3
Lead	5.8	0.2	1.7	0.0
Mercury	20.6	2.1	3.3	0.7
Selenium	0.6	0.2	0.9	0.2
Zinc	2.7	1.1	1.9	0.5

Notes:
Cells are shaded if the value is greater than 1.0.

TABLE 7-7
FOOD CHAIN MODEL – ECOLOGICAL HAZARD QUOTIENTS
AVERAGE SCENARIO, PISCIVOROUS RECEPTORS
SITE 2
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Chemical	Insectivorous Receptor HQs			
	Green Heron		Mink	
	NOAEL	LOAEL	NOAEL	LOAEL
Pesticides/PCBs				
4,4'-DDD	0.002	0.0002	0.001	0.00002
4,4'-DDE	0.1	0.01	0.04	0.001
4,4'-DDT	0.01	0.001	0.005	0.0001
Total DDT	0.20	0.02	0.1	0.002
Aldrin	NA	NA	0.001	0.0003
Alpha-Chlordane	0.01	0.001	0.001	0.0003
Gamma-Chlordane	0.005	0.001	0.001	0.0003
Alpha BHC	0.004	0.001	0.05	0.01
Beta BHC	0.002	0.001	0.0001	0.00002
Delta BHC	0.003	0.001	0.04	0.004
Endrin Ketone	0.0001	0.00001	0.000004	0.0000
Heptachlor	NA	NA	0.003	0.0003
Heptachlor Epoxide	NA	NA	0.003	0.0003
Inorganics				
Arsenic	0.04	0.02	0.03	0.01
Copper	0.6	0.1	0.1	0.01
Lead	0.4	0.01	0.1	0.001
Mercury	2.7	0.3	0.2	0.03
Selenium	0.2	0.1	0.1	0.03
Zinc	0.3	0.1	0.1	0.02

Notes:
Cells are shaded if the value is greater than 1.0.

The food chain HQs in Tables 7-6 and 7-7 assume an area use factor of 1.0, meaning the representative receptors are assumed to forage exclusively in the area where samples were collected. Piscivorous birds and mammals forage over large areas, however, and would obtain only a fraction of their food from the area where samples were collected. With this in mind, the food chain HQs in Table 7-7 provide strong support to conclude that bioaccumulative COPCs in surface water and sediment at Site 2 pose negligible risks to piscivorous mammals represented by the mink, and (with the possible exception of mercury) to piscivorous birds represented by the green heron.

In risk assessments, the home range size can be used to determine the proportion of time that an individual animal is expected to contact contaminated environmental media. Home range is defined as the geographic area encompassed by an animal's activities (except migration) over a specified time. Green heron home ranges are variable and specific home range data for the green heron were not located, so the extent to which piscivorous birds represented by the green heron would forage at Site 2 is uncertain.

TABLE 2-1

ARARs AND TBC CRITERIA
NCBC GULFPORT, MISSISSIPPI
PAGE 1 OF 3

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 in accordance with 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 in accordance with 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 2-1

ARARs AND TBC CRITERIA
NCBC GULFPORT, MISSISSIPPI
PAGE 2 OF 3

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 that 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 that 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 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 Mississippi 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. Mississippi 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 2-1

ARARs AND TBC CRITERIA
NCBC GULFPORT, MISSISSIPPI
PAGE 3 OF 3

NAME / CITATION	REQUIREMENT	TYPE / PREREQUISITES	CATEGORY
Nonhazardous Solid Waste Management Regulations Mississippi 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, Mississippi 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 Number MSRMS4036.	Action-specific
Air Emission Regulations for the Prevention, Abatement, and Control of Air Contaminants, Specific Criteria for Sources of Particulate Matter, Mississippi 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:
CFR = Code of Federal Regulations
DOT = Department of Transportation
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act
NPDES = National Pollutant Discharge Elimination System
RCRA = Federal Resource Conservation and Recovery Act

APPENDIX D

PUBLIC MEETING TRANSCRIPTION

TETRA TECH, INCORPORATED

****

NAVAL CONSTRUCTION BATTALION CENTER

SITE 2 PROPOSED PLAN

PUBLIC MEETING COMMENTS

****

Meeting Held at the Gulfport Public Library, 1708 25th Avenue, Gulfport, Mississippi on Tuesday, December 2, 2014, beginning at 2:00 p.m.

REPORTED BY:

Melissa L. Burdine
Simpson Burdine & Migues
Post Office Box 4134
Biloxi, Mississippi 39535
(228) 388-3130

T-A-B-L-E O-F C-O-N-T-E-N-T-S

MS. TATUM:

My comment is that the yearly and annual report, after everything has been cleaned up, that that report be placed in a repository and also disseminated throughout the contiguous landowners around the site. And I would also like to have a copy of the report placed on MDEQ's website and there each year afterwards.

- - -

(End of public comments.)

CERTIFICATE OF COURT REPORTER

I, MELISSA L. BURDINE, Court Reporter and Notary Public, in and for the County of Harrison, State of Mississippi, hereby certify that the foregoing pages, and including this page, contain a true and correct copy of my stenotype notes and/or electronic tape recording of the testimony of the witnesses, as taken by me at the time and place heretofore stated, to the best of my skill and ability.

I further certify that I placed the witnesses under oath to truthfully answer all questions in this matter under the authority vested in me by the State of Mississippi.

I further certify that I am not in the employ of, or related to, any counsel or party in this matter, and have no interest, monetary or otherwise, in the final outcome of the proceedings.

Witness my signature and seal, this the 12th day of December, 2014.

Melissa L. Burdine
My Commission Expires 5/04/16