APPENDIX D

Consolidated Dredge Plan

Part 1

Consolidated Dredge Plan
AES Sparrows Point LNG Terminal & Mid-Atlantic Express Pipeline

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1. INTRODUCTION

1.1 Project Description

AES Sparrows Point LNG, LLC ("Sparrows Point LNG") proposes to construct, own, and operate a new liquefied natural gas ("LNG") import, storage, and regasification terminal ("LNG Terminal") at the Sparrows Point Industrial Complex situated on the Sparrows Point peninsula east of the Port of Baltimore in Maryland. LNG will be delivered to the LNG Terminal by LNG marine vessels, offloaded from these vessels to shoreside storage tanks, regasified to natural gas on the LNG Terminal site ("Terminal Site"), and the regasified natural gas transported to consumers by pipeline. The LNG Terminal will have a regasification capacity of 1.5 billion standard cubic feet of natural gas per day ("bscfd"), with the potential to expand to 2.25 bscfd. Regasified natural gas will be delivered to markets in the Mid-Atlantic Region and northern portions of the South Atlantic Region through an approximately 88-mile, 30-inch outside diameter interstate natural gas pipeline ("Pipeline") to be constructed and operated by Mid-Atlantic Express, L.L.C. ("Mid-Atlantic Express"). The Pipeline will extend from the LNG Terminal to points of interconnection with existing interstate natural gas pipeline systems near Eagle, Pennsylvania. Together the LNG Terminal and Pipeline projects are referred to as the Sparrows Point Project or Project. Both Sparrows Point LNG and Mid-Atlantic Express (hereinafter collectively referred to as "AES") are subsidiaries of The AES Corporation.

The Project footprint is located in the counties of Baltimore, Harford, and Cecil in Maryland and the counties of Lancaster and Chester in Pennsylvania. The Terminal Site, which is located entirely within Baltimore County, is a parcel located within a former shipyard. The route proposed for the Pipeline ("Pipeline Route"), which crosses all of the listed counties, includes industrial, commercial, agricultural, and residential lands. Together, the Terminal Site and the Pipeline Route comprise the Project Area.

Construction of the LNG Terminal will include widening and deepening the existing marine approach channel leading off of the Brewerton Channel and creating a turning basin immediately offshore of the Terminal Site to accommodate the ships expected to deliver LNG at the LNG Terminal.

The Brewerton Channel, the existing approach channel, and certain areas offshore of the proposed Terminal Site, have been dredged in the past. United States Army Corps of Engineers ("ACOE") permits and a Water Quality Certification from the State of Maryland, Maryland Department of Environment ("MDE") authorize dredging in these areas using hydraulic or mechanical techniques. Dredging of the approach channel and areas offshore of the proposed Terminal Site is allowed under existing permits for maintenance and waterfront operations to a depth of 39 feet below mean low low water ("MLLW"). In addition, on May 6, 2005, the ACOE issued a permit to BWI-Sparrows Point LLC (CENAB-OP-RMN [BWI-Sparrows Point LLC/Dredging] 04-64865-1) ("BWI Permit") approving mechanical or hydraulic dredging of a channel, turning basin, and berthing areas to 39 feet below MLLW, and to place approximately 600,000 cubic yards ("CY") of dredge material at the Hart-Miller Island disposal site. The BWI Permit also approved a subsequent phase consisting of the deposit of approximately 2.6 million CY of dredge material at disposal sites yet to be determined. Finally, the permit approved certain construction of sheet piling and fendering systems.

A large part of the dredge areas required for the LNG Terminal have been approved under the BWI Permit, however, the dredging currently approved is for a ship repair/maintenance facility at that site, and not for construction and operation of the LNG Terminal. In addition, AES has been informed by the ACOE that the BWI Permit is non-transferable. Accordingly, the description of the marine dredging contained herein has been developed to anticipate dredge operations consistent with this location's currently existing permit and conditions, however without taking into account any of the future dredging contemplated in the validly-issued BWI Permit. Depending on the bathymetric conditions of the dredge areas at the time of Project construction, the actual volumes of dredged and material handling requirements may be less than envisioned.

The approach channel expansions will be performed primarily by use of conventional mechanical clamshell dredge, with some limited areas near shore excavated by backhoe dredge. The limits of the existing approach channel and area bathymetry, and the dredge area proposed by AES, is shown on Figure 1-1.

Dredging is anticipated to begin in the berthing area immediately adjacent to the Terminal Site, and progress in reaches towards the Brewerton Channel to allow for earlier commencement of pier/dock construction operations. Assuming a dredged channel and turning basin depth of 45 feet, it is estimated that approximately 3.7 million CY of dredged material may be generated, a portion of which will be processed and recycled. Maintenance dredging under current permits may decrease this amount somewhat, depending on the amount performed prior to LNG Terminal construction.

Attached are copies of bathymetric survey results from Barletta Willis Incorporated ("BWI") post-dredge survey completed in January of 2007. Figure 1-2 provides the depth soundings and Figure 1-3 provides the depth contours. The bathymetric survey results cover the entirety of the proposed AES dredge area with the exception of less than 2.5 acres located on the northwest margin of the proposed turning basin and a smaller portion along the pier shoreline (Figure 1-3). AES supplemented the areas not covered by the 2007 BWI survey with information from GEODAS. Figure 1-4 combines the 2007 BWI depth contour survey data with the GEODAS survey data for those areas proposed to be dredged by AES that were not included in the 2007 BWI survey.

It is AES's intention to complete a survey both pre- and post-dredge activities to confirm actual amounts removed during the construction of the Project. This updated survey information will be provided to appropriate agencies once available.

Regarding disposal of the dredged sediments, several dredging projects in the Project Area have been approved in recent years that included the disposal of dredged materials at the Hart-Miller Island Disposal site, as summarized in Table 1-1. AES does not expect to utilize the Hart-Miller Island Disposal site nor any other disposal sites used or to be used by the Maryland Port Administration. Instead, AES will recycle the dredged sediments and dredged material disposition will be via reuse or disposal as described below. AES's proposed dredge recycling program is consistent with and supportive of the State of Maryland's Dredged Material Management Program, which was renewed by the Dredged Material Management Act of 2001 ("Act"). Among other things, the Act defined a hierarchy of preferences for the disposition of dredged materials from the tidal waters of Maryland's portion of Chesapeake Bay. The hierarchy of preferences includes innovative re-use (recycling), among other things. The Act also established an Executive Committee to oversee decisions about the management of dredged materials. The Executive Committee adopted a 2003 recommendation that the State immediately begin serious efforts aimed at determining how to innovatively reuse (or recycle) dredged material, and should be recycling 500,000 cubic yards of Harbor material by 2023.

1.2 Volume and Handling of Dredged Material

The "in-place" estimate of material to be dredged is 3.7 million CY. The bulking factor for mechanically dredged silt (freshly deposited to consolidated) ranges from 1.0 to 1.4 (Bray, 1979). The bulking factor for mechanically dredged sand ranges from 1.05 to 1.35 (Bray, 1979). The bulking factor from mechanically dredged clay ranges from 1.0 to 1.25 (Bray, 1979). It should be noted that these bulking factors were determined "in the scow" after dredging only.

Detailed volume estimates of each type of material that will be generated as a result of this project are as summarized below. Using a conservative average bulking factor of 1.2 would result in approximately 4.4 million CY of mechanically dredged material, or "scow yards".

The processing of the dredged material, which includes addition of cementitious additives, induces a hydration reaction within the dredged material, thereby adsorbing pore water, decreasing pore space, and minimizing the effective bulking rate. Based on information obtained from processors in New Jersey, the measured unit weight (wet bulk density) of sediment *in-situ* averages approximately 78 to 84 pounds per cubic foot. Following processing at a DMRF with 8 percent by weight cement additive, the wet bulk density of the processed dredged material averages approximately 90 to 100 pounds per cubic foot. This would indicate minimal to no increase in volume (bulking), if not a net shrinkage, in the processed dredged material versus the in-place sediment volume.

Further densification of the material takes place during placement activities. In an upland beneficial use project completed by Clean Earth Dredging Technologies, Inc. of Hatboro, Pennsylvania, calculations from pre- and post-dredge hydrographic surveys showed that 79,040 CY of sediment were removed by mechanical dredging methods from the Claremont Channel in Jersey City, New Jersey. Clean Earth processed this raw dredged material through its DMRF, also located on the Claremont Channel, in the same manner as is proposed for this project. (Note: the Claremont Channel DMRF is essentially identical to the DMRF proposed at Sparrows Point). The processed dredged material was transported to a neighboring property for use as grading fill material at a golf course development. A pre- and post-land construction survey revealed that a total of 85,650 CY of material were measured in place at the beneficial use site. These volumes result in a bulking factor of 1.08.

The real-world bulking factor of 1.08 confirmed above is consistent with the conservative estimate provided by AES and the bulking factors described by Bray that are noted above.

As part of the Project construction phase, AES will construct a DMRF adjacent to the waterway at the Terminal Site. The 10,000 cubic yard per day DMRF will occupy approximately five acres of upland property as shown on Figure 1-5 and 1-6. The DMRF will consist of duplicate (parallel) processing systems, each consisting of the following major components: a steel receiving hopper, a low-incline conveyor belt, a vibratory screen scalping unit that will actively screen the dredged material feed to a 4-inch minus cut, an oversized material/debris deflection chute, a concrete pad storage area, a pugmill processing system, steel pneumatic bulk storage silos, a steel receiving hopper, a radial stacking conveyor, and a concrete pad storage area for the processed dredged material contained by interlocked retaining wall units. The pugmill units will be completely enclosed; therefore, there will not be emissions associated with the operation of the pugmill units.

The DMRF will accept the dredged material directly from the work scows described below. No storage of the dredged material will be necessary. After it passes through the DMRF, the dredged material becomes a useful product ("Processed Dredged Material" or "PDM"). Once the PDM exits the pugmill processing system the useful material will be stored in the adjacent 10-acre PDM storage area. The temporary PDM storage area will consist of an additional 20±acre area (comprising a total aggregate area of approximately 30-acres) covered by bituminous paving or lined with a 10-mil high density polyethylene ("HDPE") liner covered by 6- to 12-inches of existing site soil or imported soil. After the PDM is tested and determined to be structurally suitable, AES will use some of the PDM for establishment of new site grades at the proposed LNG Terminal if the material is available to meet the construction schedule and meets final design fill specifications for use. The balance of the PDM will be marketed for off-site commercial use by third parties. A scale house and truck scale will be located adjacent to the temporary PDM storage area for weighing of the outbound shipments of the PDM product upon sale. Existing site roadways will be used for outbound shipments of the PDM product. Shipping will be by conventional dump truck or trailer vehicles observing vehicle weight limits established for federal, state, and local roadways or possibly rail cars; transportation routes capable of handling weights of the vehicles will be used for shipment of the material to purchasers/end users.

1.3 Filings to Date

As part of the Project permitting process, AES has filed the following permit applications, inclusive of the dredging operations and construction and operation of the DMRF:

Major Permits, Approvals and Consultations for the AES Sparrows Point Dredging Project

AGENCY	PERMIT APPLICATION/DATE REQUEST RESPONSE	FILING DATE
PROJECT PERMITS		
Federal Energy Regulatory Commission (FERC)	AES's Application for Certificate of Public Convenience and Necessity	January 2007
	AES's Responses to the FERC's March 16, 2007 Environmental Information Request	April 2007
	AES's Responses to the FERC's July 11, 2007 Environmental Information Request	July 2007
U.S. Army Corps of Engineers (ACOE)	AES's Application for Clean Water Act (CWA) Section 404 dredge or fill permit (issued jointly with MDE) and Rivers and Harbors Act Section 10 authorization Note: CWA Section 401 – Done by MDE	January 2007
	REVISED - AES Application for Clean Water Act (CWA) Section 404 dredge or fill permit (issued jointly with MDE) and Rivers and Harbors Act Section 10 authorization	April 2007
	AES's responses to Minutes from the Meeting on Dredging /Dredged Material Disposal with FERC, the ACOE, the U.S. Environmental Protection Agency ("EPA") and Maryland Department of Environment ("MDE") that were posted to the FERC website on June 12, 2007.	June 2007
	AES's Responses to the ACOE Data Request dated July 6, 2007	July 2007

Major Permits, Approvals and Consultations for the AES Sparrows Point Dredging Project		
AGENCY	**PERMIT APPLICATION/DATE REQUEST RESPONSE**	**FILING DATE**
	Report on AES Sparrows Point August 2007 Sediment Sampling and Results submitted to ACOE	September 2007
	Addendum to Report on AES Sparrows Point August 2007 Sediment Sampling and Results submitted to ACOE	October 2007
Maryland Department of Environment (“MDE”)	AES’s Application to MDE under the Maryland Coastal Facilities Review Act (“CFRA”)	January 2007
	AES’s Responses to MDE’s May 7, 2007 Data Request	May 2007
	AES’s Responses to MDE’s August 15, 2007 Data Request 2	August 2007
DREDGING OPERATIONS PERMITS		
U.S. Army Corps of Engineers/ Maryland Department of Environment	Joint Federal State Permit for Alternation of a Tidal Wetland in Maryland	Included as part of January ACOE Section 404/10 Permit Application and MDE CFRA Applications in January 2007
DREDGED MATERIAL PROCESSING FACILITY PERMITS		
Maryland Department of Environment	General Permit for Stormwater Discharge Associated with Construction Activities	Included as part of AES’s MDE CFRA Applications in January 2007
	State Water Quality Certificate	Included as part of AES’s MDE CFRA Applications in January 2007
	Air Quality Permit to Construct	Included as part of AES’s MDE CFRA Applications in January 2007

2. INTRODUCTION

2.1 Biota

As discussed in the FERC filing, specifically, Resource Report 2, *Water Use and Quality*, Section 2.4.8.2, and in Resource Report 3, *Vegetation and Wildlife*, Sections 3.3.2, 3.3.3, and 3.4.3, as well as in Resource Report 3, *Vegetation and Wildlife*, Appendix 3B, Essential Fish Habitat Report, and Appendix 3A, Aquatic Finfish/Epibenthic Invertebrate Sampling Data Report, there is little in the way of non-transitory animal species in the vicinity of the Terminal Site. The species that do exist, the polychaete, *Streblospio benedicti* (which was present in high numbers due to its affinity and association with high pollution levels), barnacles (subclass Cirripedia), fan worms (*Sabella spp*.), and zebra mussels (*Dreissena polymorpha*), were the most abundant. These species, and species that use the non-transitory species as a source of food, are unlikely to suffer negative impacts as recolonization rates for the non-transitory species are both rapid and high. Importantly, there is no submerged aquatic vegetation ("SAV") located within the planned dredge area proper, nor within approximately two miles of the LNG Terminal and no negative impacts to SAV along the proposed LNG marine traffic transit routes are expected as no SAV beds have been documented along the proposed ship transit route. The closest SAV location recently reported by Orth et al. (2005) was approximately three miles south of the LNG Terminal on the western side of the Patapsco River in Stony Creek. Older records suggest a similar lack of SAV historically within three miles of the LNG Terminal (Orth et al. 1994). All dredging associated with the Project will occur within approximately one mile of the Terminal Site.

As reported in Resource Report 3, *Vegetation and Wildlife*, Appendix A, marine field surveys were performed by AES between June 27 and June 30, 2006 that confirmed the absence of SAV within approximately two miles of the LNG Terminal. The presence or absence of SAV beds was determined by evaluating a series of transects located within and adjacent to the proposed footprint of the LNG Terminal, and extending radially approximately two miles into the Patapsco River estuary. Furthermore, sample locations surveyed outside of the proposed LNG Terminal footprint, but in the general vicinity of the LNG Terminal, included the eastern side of the Patapsco River. Sampling consisted of visual observations and the towing of a small chain for approximately 0.3 nautical miles per transect at a speed of approximately two knots. At the completion of each transect, any vegetation collected was identified to the species level.

Additionally, AES evaluated the potential for siltation from dredging and impact on biotic resources in the general area of the LNG Terminal. The Fort Carroll oyster reef restoration project, or Project 64, is an education-based oyster reef restoration project on upper Chesapeake Bay oysters (NOAA 2006) that is located about 1,500 feet away from the closest area proposed to be dredged (West Northwest from the approach channel). Multiple studies (Borrowman (2006), Dredge Research, Ltd. (2003), Tubman & Corson (2000) and Collins (1995)) have reported turbidity plumes may be generated from dredging activities; dredging from clamshell, hydraulic, and hopper dredging within soft sediments are highest within the dredge site and decrease with distance away from the site. These studies furthermore determined that at a distance of about 400 meters (1,200 feet) or greater away from the dredge site, turbidity levels were generally negligible and had little to no impact on oyster bed survival and growth (Kennedy and Breisch 1981). Given that the closest point of any dredging activity to the oyster restoration site is at least 1,500 feet away from the dredging site, it is anticipated that there will be no negative impacts on the Ft. Carroll oyster restoration project.

2.2 Water and Sediment Quality

AES reviewed information from the various federal, state, and local environmental databases using the electronic database service First Search. Maryland has listed Baltimore Harbor and the Patapsco River as "impaired," because of excess contaminants, sediments or nutrients, or all three. In spring of 2002, researchers from the University of Maryland Center for Environmental Science ("UMCES") analyzed sediment samples from locations throughout Baltimore Harbor, and used the data to create a map of contaminant locations and concentrations. Below is a summary of identified chemical hotspots, including concentrations of various organic compounds and heavy metals. This study also found persistent levels of chlordane throughout the Harbor. The organic and heavy metal compounds detected in the UMCES analysis include:

- Polychlorinated biphenyls ("PCBs") and poly aromatic hydrocarbons ("PAHs") appeared in high concentrations in the Inner Harbor, which is reported to reflect the influence of stormwater runoff carried to the Harbor from Jones Falls.[1] PAHs were reported in the references as elevated in sediment on the southern shore of Sparrows Point, and in Bear Creek sediments, probably due to heavy industry in these areas. PCB concentrations were reported as elevated in Bear Creek and Curtis Creek, relative to other sites along the Patapsco River.

- Zinc and chromium were reported as elevated in Bear Creek and at several sites in Northwest Branch.

- Nickel exhibited high values at 70 percent of the sites sampled across the area.

- Mercury was reported as highest at the entrance to the Inner Harbor, likely due to stormwater runoff; high concentrations also occurred in Curtis Creek, Bear Creek, and Back River.

- Copper was highest in Northwest Branch and Curtis Creek.

Water flow in the Sparrows Point area is primarily influenced by Patapsco River input from the west and Bear Creek input from the north. The confluence of the two waterbodies is located north and west of the Terminal Site, and the combined surface water flow generally carries surface water and entrained sediment into and past the western shores of Sparrows Point. In addition, a low tidal range (approximately ± two feet) introduces some flux contrary to the river/creek flows (i.e., incoming tide will somewhat offset outgoing river and/or creek flow). Thus, inputs of compounds of concern from urban sources will, in general, flow toward the main portions of the Chesapeake Bay. The chemical nature of different compounds of concern, and geochemical interactions as they affect environmental migration within the system, are further described below.

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[1] PAHs are chemicals typically generated from the incomplete combustion of fossil fuels. The main source of PAHs is fossil fuels, where they occur naturally. They can flow into the water during spills or be carried in by urban runoff, which collects oil and grease on roads. After combustion, PAHs attached to particles can enter the water directly through atmospheric deposition or indirectly through runoff. Metals are trace heavy metals found in sediments that can be the result of naturally occurring materials or the result of contamination from anthropogenic sources such as heavy industry. This category includes substances such as; arsenic, cadmium, chromium, copper, iron, lead, mercury, etc

The Baltimore Harbor system, including the Patapsco River estuary, is surrounded by the Baltimore metropolitan region. During the past several years, extensive studies have been conducted of the levels of metals, mercury, and organic contaminants in Baltimore Harbor sediments (Ashley and Baker, 1999; McGee et al.; 1999; Mason and Lawrence; 1999) and surface waters (Bamford et al.; 1999).[2] These studies showed large spatial gradients in contaminant levels in the sediments due to relatively poor mixing that resulted in "hot spots" near storm water outfalls and industrial areas. For example, elevated levels of PAHs and metals were indicated to be found around Sparrows Point, which historically has been the site of intensive coal coking and steel production. (CERP, 2002)

Organochlorine compounds, including PCBs, were shown to be at elevated levels adjacent to Harbor storm water outfalls. Forty percent of the sites characterized within the Baltimore Harbor have PCB levels that exceed the "effects range-medium" value of Long, et al. (1995). Survival of the estuarine amphipod *Leptocheirus plumulosus* was reduced in seven of twenty-five Baltimore Harbor sediment sites studied by McGee et al. (1999). Further, the reported toxicity of sediment at monitoring stations in Bear and Colgate Creeks was determined to potentially have been due to sediment-associated metals, while sediment toxicity in the Inner Harbor was likely due to both metals and organic contaminants (PAHs).

A number of trace element contaminants were reported as present in Chesapeake Bay sediments at concentrations that can potentially have harmful effects (Eskin et al. 1996). Trace element contaminants can be categorized into different groups depending on their chemical and toxicological behavior.

In the September 1993 Toxics Reduction Strategy Reevaluation Directive, the Chesapeake Executive Council designated Baltimore Harbor, the Anacostia River, and the Elizabeth River as Chesapeake Bay Regions of Concern (areas with known chemical contaminant-related impacts). These Regions of Concern are focal points for multi-agency cooperative efforts with respect to specific toxic assessments, reduction and prevention within the tidal waters of the Chesapeake Bay. In the Chesapeake Bay Regions of Concern, hydrocarbons, including PAHs, are the most likely organic chemicals causing ambient toxicity, while the persistent organochlorines (e.g., PCBs) are most likely of concern in bio-magnification. The report summarized that, although a myriad of organic chemicals are produced and released to the Chesapeake Bay region, including Baltimore Harbor, only those with sufficient persistence and particle-reactivity will accumulate in sediments. These organic chemicals may be classified by source or by their potential effects. Many organic chemicals found in Chesapeake Bay sediments are inadvertently produced through the combustion of carbon-containing fuels such as wood, coal and diesel (PAHs) and the incineration of industrial, medical, and municipal wastes (chlorinated dioxins and furans). Others are industrial and agricultural chemicals that enter the environment during manufacturing and shipping, through improper disposal practices, or through agricultural runoff (e.g., chlordane in Baltimore Harbor).

[2] Other historical studies have been performed for the general areas surrounding the Terminal Site. Focus is given to the referenced studies due to the closer proximity in time and applicability of location as compared to those other studies. Site-specific testing, described in Resource Report 2, *Water Use and Quality*, Section 2.4.3.2, was conducted by AES to confirm consistency with the referenced studies.

2.3 Site Specific Sediment Studies

2.3.1 Sediment Sampling and Results – June 2006

In June 2006, AES collected sediment samples from a floating barge[3] using a vibracore sampler to extract sediment samples from three depths identified as "shallow" (0 to two feet below the sediment surface), "intermediate" (depths greater than two feet below the sediment surface but less than 10 feet), and "deep" (depths greater than 10 feet below the sediment surface and targeted at the projected 45-feet below sea level, the depth to which dredging would be conducted for the shipping channel and turning basin). Shallow and intermediate samples are representative of the sediment that would be removed during the course of the proposed channel dredging, and deep samples are representative of the channel and sediment surface that would be exposed to the benthic environment after the completion of dredging operations.

Locations of the vibracore drilling and sampling are shown on Figure 2-1. During the sampling event, 15 locations were cored, and 16 sediment samples were collected for off-site laboratory analysis, nine shallow, three intermediate, and four deep. Locations and depths of sample collections were selected to provide overall sediment quality information for the area potentially subject to dredging due to the fact that the proposed area of the shipping channel and turning basin was still under evaluation and subject to change at the time of vibracore sampling. This potential for change is indicated by the former shipping channel and turning basin alignment submitted to the FERC in filings in March and May 2006, relative to an updated channel and turning basin submitted in a Resource Report 1, *General Project Description*, on August 18, 2006. Both the current and former channel and turning basin configuration are shown on Figure 2-1.

AES filed its application to the ACOE for approval of dredge operations concurrently with its formal application to the FERC in January 2007. The application was based on the existing data collected by others in the proposed dredge area and data collected specifically for the Project by contractors retained by AES.

Each sample was submitted under an intact chain of custody to an on shore laboratory, Caliber Analytical Services located in Towson, Maryland, for the analysis of organic and inorganic parameters in accordance with EPA promulgated methods. VOCs were determined using EPA Method 8260B, semi-VOC concentrations were determined using EPA Method 8270C, and chlorinated pesticides and PCBs were determined using EPA Method 8081A. Inorganic parameters including the priority pollutant metals and total cyanide which were analyzed in accordance with EPA Methods 6020A and 9012 respectively. Additional parameters of analysis included tributyl tin by VIMS Method 338, Total Organic Carbon ("TOC") by ASTM Method D5373, and hexavalent chromium ("Cr^{6+}") by EPA Method 7196A. Tributyl tin and hexavalent chromium, while not required analytes by ACOE Guidance for dredge material characterization, were analyzed based on community input received relative to sediment quality and industrial practices in the area.

Table 2-2 presents a summary of the laboratory results for the shallow, intermediate, and deep samples. Results are also shown in a series of three figures attached, Figure 2-2, Figure 2-3, and Figure 2-4 for the shallow, intermediate, and deep samples respectively. In summary:

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[3] Samples were collected via vibracore sampling methods to recover representative, undisturbed sub-bottom sediment samples. Samples were collected within new, clean lexan liners within the vibracore sample tubes; upon recovery, the cores were examined by an experienced environmental geologist, sample logs generated (see Appendix J to Resource Report 13, *Engineering and Design Material,* for the logs), and samples were selected from the appropriate sample intervals and contained in new, clean, laboratory-supplied sample jars. Samples were transported under chain-of-custody procedures to the Maryland-certified environmental laboratory for analysis using EPA analytical procedures appropriate to the analytes of interest.

- Neither pesticides nor PCBs were detected in any of the sediment samples collected.

- PAHs (included with the semi-volatile analyses) were detected in each of the sediment samples collected from the shallow and intermediate sampling depths; however, PAHs were generally not detected in the deep samples. The concentrations detected tended to be in the part-per-billion ("PPB") to part-per-million ("PPM") range, consistent with data from this same area associated with past dredge sampling, and consistent with other areas in the Port of Baltimore area (see further discussion on this below).

- Elevated levels of several metals were detected in the shallow and intermediate samples collected (see Table 2-2). Generally, consistent with the PAH trend above, the concentrations of detected metals dropped with depth of sample (i.e., shallow and intermediate results were higher than deep results). The concentrations of metals detected tended to be in the PPM range, again consistent with area data associated with past dredge sampling and agency investigations of the Port of Baltimore (see further discussion on this below).

- Analyses conducted for dioxins are contained in Table 2-2. Concentrations detected were all low, in the part-per-trillion ("PPT") range, and are consistent with values reported in literature for the Baltimore and Chesapeake Bay area, and believed to be a result of atmospheric deposition (Derrick, et. al., 2001; Van den Burg, et al, 2005). The data have been listed by individual compound; however, aggregate toxicity is represented by calculating a single value for all dioxins combined in terms of the most toxic dioxin congener 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Based on this comparison, no samples exceed the apparent effects threshold ("AET") included in the National Oceanic and Atmospheric Administration ("NOAA") Screening Quick Reference Table (SQUIRT – see Buchman, 1999), the threshold where effects on marine biological organisms may be expected, with the exception of one sample in vibracore boring HA-114 (see Figure 2-1 for location). As shown on Figure 2-1, this sample was taken from an area no longer subject to potential dredging due to relocation of the planned approach channel and turning basin.

Overall, these data indicate that the removal of the shallow and some of the intermediate sediment during dredging operations should improve the conditions in the areas tested and to be dredged.

The sampling results obtained by AES were compared with NOAA screening values for chemical compounds in sediment that may result in an observable toxicity effect on marine biota. On Figures 2-2, 2-3 and 2-4, the samples with detectable compounds are presented relative to Marine Sediment Guidelines from the NOAA Quick Reference Tables ("SQUIRT") values, see reference for Buchman 1999). The NOAA SQUIRT values are divided into three separate categories:

- **TEL** – Threshold Effects Level; represents the concentration below which adverse effects are expected to occur only rarely.

- **PEL** – Probable Effects Level; represents the concentration above which adverse effects are frequently expected.

- **AET –** Apparent Effects Threshold; represents the concentration above which adverse biological impacts would always be expected by the biological indicators.

If a compound was both detected and exceeded a SQUIRT guideline, it is shown relative to its associated vibracore boring location. Note that PCBs were analyzed using EPA Method 8081A, appropriate for evaluation of PCB content for innovative recycling treatment and disposal methods. Because the material will be dredged and removed from the marine setting, ultra-low PCB detection limits that may otherwise be used for comparison to SQUIRT criteria were not used. MDNR was consulted regarding the test methods performed. MDNR concurred that test method 8081A was an appropriate method for the evaluation of recycling the dredged material. MDNR indicated that a low-detection limit, congener-specific method would be needed for PCB toxicity evaluation, which was performed during the subsequent August 2007 sampling program described in Section 2.3.2.

As shown in Table 2-2 the primary detected compounds are PAHs and metals – these results are shown by location and comparison to the NOAA Screening values on Figures 2-2, 2-3 and 2-4. By comparing the detected compounds for those that exceed the SQUIRT values, it is evident that both the concentration and number of PAH and metals detections diminish to a point of no SQUIRT exceedances in the deep sediments for PAH compounds, and only slight exceedances for nickel (at two locations) and arsenic (at one location). See Figure 2-4.

An analysis was performed of the sampling results obtained from the June 2006 sampling event that compared those results with results from three other studies conducted in the general vicinity offshore of the Terminal Site and Baltimore Harbor area. The other studies included:

- Baltimore Harbor Anchorages and Channels, Maryland and Virginia. Integrated Feasibility Report and Environmental Impact Statement. U.S. Army Corps of Engineers, Baltimore District. March 1997 (ACOE 1997).

- Registered Toxic Study. Chemical and Physical Analysis of Sediments from the Marine Channel and Associated Berths and Turning Basin. EA Engineering, Science, and Technology, Inc. February 1985.

- Registered Toxic Study. Spatial Mapping of Sedimentary Contaminants in the Baltimore Harbor/Patapsco River/Back River System. Maryland Department of the Environment. August 1997.

A summary of the June 2006 vibracore results (average concentrations for shallow, intermediate, and deep samples) is provided, along with a similar summary of averaged analytical data from these three listed studies, on Table 2-4. Based on upon this comparative analysis, the following was observed:

- PAH concentrations detected in the June 2006 vibracore samples tended to be higher than those reported for Baltimore Harbor Anchorages and Channels (ACOE, 1997), but consistent with or lower for several PAH compound concentrations documented in the MDE Baltimore Harbor/Patapsco River/Back River study (ACOE 1997), and the sampling performed for the Sparrows Point Marine Channel (EA Engineering Science, 1985). The individual PAH compounds that were higher in the June 2006 vibracore samples than the comparison studies included the compounds Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Bis(2-ethylhexl)phthal-ate and Pyrene. In addition, these comparison values are skewed by the highest sample values from the shallow and intermediate sample locations associated with the former turning basin and pier arrangement (samples HA-111, HA-114 - see Figure 2-1), which will not be subject to dredging under the updated channel and turning basin configuration. With sample HA-111 removed from the shallow average calculation, four PAH constituents increase by five to ten percent, while the remaining twelve PAH constituent concentrations decrease from two to 39 percent. The removal of sample HA-114 from the intermediate sample average results in decreases in all PAH concentrations ranging from 82 to 100 percent.

- Metals detected in the June 2006 vibracore samples show values consistent with the reference studies (see Table 2-4).

In summary, the data show that the highest concentrations of chemical constituents, primarily semi-volatile PAHs and heavy metals, are found in the shallow, fine-grained sediments with high organic carbon content that accumulate in low-energy depositional areas that tend to be close to the shore. These are the areas of samples HA-111 and HA-114, which are outside of the current shipping channel/turning basin area to be dredged. Constituent concentrations generally decrease with depth at all locations, and decrease with distance from shore. The depth range of sediments with elevated constituent concentrations also appears to thin further away from the shore, consistent with net import and deposition of fine-grained sediments close to the shore, rather than net scour and export of these sediments.

Comparison of the June 2006 vibracore constituent concentrations and ranges of positive detections (Table 2-2) with concentration averages in the historical data (Table 2-4) show concentrations of detected chemical constituents in shallow sediments within the proposed Project Area are generally similar to concentrations in sediments within other portions of the Baltimore Harbor/Patapsco River/Back River system. The locations of the historic vibracore and sediment samples are shown on Figure 2-5. Deeper sediments within the area proposed to be dredged, which would account for the majority of the total volume proposed to be dredged, contain much lower concentrations of these constituents compared to the historical data, ranging to undetectable levels.

Careful consideration of practicable and permittable disposition options for the dredged material is warranted based on anticipated volumes and sampling results. The chemical characterization data include the range of constituents and types of methods prescribed by the ACOE and the EPA for evaluating dredged material for placement at permitted areas.

While AES does not propose ocean disposal of dredge material, AES conducted a sediment evaluation program including a tiered sequence of chemical characterization of bulk sediment, sediment elutriate, and potentially toxicity and bioaccumulation testing, performed in accordance with regional implementation requirements that are generally consistent with the Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual (EPA and ACOE, 1991). Under procedures described therein, sediments are characterized chemically from which bulk chemical data may be used to predict water quality under conservative assumptions, that is, assuming that chemical constituents in sediments are released to the water column during disposal. The next tier in sediment evaluation involves generating elutriate from bulk sediments, and directly measuring constituent concentrations in the elutriate water, more realistically reflecting conditions in the water column following disposal.

Elutriate data collected were generated for four sets of sediment composites (results reported in Table 2-3). When compared against both acute and chronic marine water quality criteria, the elutriate data indicate that the majority of sediments to be dredged from the channel and proposed turning basin would likely suitable for ocean disposal, which, again, AES is not proposing in connection with the Project. In Table 2-3, no compounds exceeded comparison criteria with the exception of concentrations for lead (8.6 µg/L) and nickel (8.9 µg/L), which slightly exceeded their respective chronic criteria (5.6 µg/L for lead and 8.3 µg/L for nickel) in the elutriate generated from one composite of shallow sediments from the three stations closest to the existing shipyard (HA-101, HA-105, HA-114). This result suggests that the sediments with the most elevated constituent concentrations from the sediments evaluated thus far would warrant further testing before suitability for ocean disposal could be determined. However, it should be noted that the location of stations HA-101, HA-105, and HA-114 is outside the current alignment of sediments that need to be removed for the shipping channel and turning basin. Notwithstanding, as has been proposed in its filings, AES will manage those sediments with relatively elevated concentrations of detected compounds, i.e., the relatively small proportion of shallow and potentially some or all of the intermediate sediments, to minimize potential risk to human health and the environment, and in a manner consistent with the beneficial recycling/innovative re-use goals of the State of Maryland.

2.3.2 Sediment Sampling and Results – August 2007

By letter dated July 3, 2007, ACOE requested that AES perform additional sediment sampling. AES responded in writing to the request for additional samples by noting it had gone well beyond the sampling required for issuance of the BWI Permit. Specifically, the ACOE approved the BWI Permit based on three composite samples, with each composite sample consisting of sediment collected from three different core locations; nine core locations total. AES expanded the extent of analyses in its initial sampling performed in June 2006 based on the level of interest from the public and agencies as expressed at project and public meetings. Public comment posited a potential of vertical stratification of sediment quality; thus, AES chose to analyze samples from different depths in order to understand depth distribution. In addition, there was expressed interest in understanding the possible presence and concentration of compounds that may have been associated with the former shipyard usage; thus, tributyl tin and PCB analyses were added to the analyte list. Finally, elutriate testing was added in order to generate objective data to characterize potential effects on water quality during dredging. The results of the 15 locations cored by AES, 16 sediment samples analyzed, and elutriate testing were all compared to area data collected by various parties within the vicinity of the Project and found to be consistent with or better than sediment quality in this area of the Port of Baltimore. In addition, depth stratification was found to be present with more contaminated sediment concentrated in the upper several feet of sediment, and sediments at depth being generally less contaminated or free of individual or categories of contaminants.

The adequacy of AES's June 2006 sampling program was discussed at a meeting with AES, ACOE, EPA, FERC, and MDE on August 1, 2007. At that meeting it was agreed that the public and the environment would best be served by conducting additional sediment sampling due to refinements made by AES in its proposed dredge area. As explained by AES at that meeting, the refinements were made to (i) decrease the area of potential bottom impact by making use of the existing Pier 1 rather than constructing a new pier, (ii) take advantage of the deep draft area adjacent to Pier 1 that was formerly used by a floating dry dock, thus decreasing the total amount of dredge, and (iii) better allow for the consistent safe maneuvering of ships based on real-time simulations performed by licensed Maryland Pilots and other maritime professionals at the Maritime Institute of Technology and Graduate Studies ("MITAGS") located in Linthicum Heights, Maryland. A subsequent meeting with ACOE and EPA was held on August 17, 2007 at which the sampling program was discussed and agreed to with the agencies. A tabular summary of the sampling program was subsequently prepared and conveyed to the ACOE and EPA by email on August 20, 2007 confirming the agreed-upon sampling program

In late-August 2007, AES collected additional sediment samples from a floating barge using a vibracore sampler to extract sediment samples from three depths identified as "shallow" (0 to two feet below the sediment surface), "intermediate" (two foot intervals at depths ranging from six to 16 feet), and "deep" (the two-foot sample interval that corresponds with the proposed bottom elevation of the shipping channel and turning basin targeted at 45 feet below MLLW (±3 feet)). Shallow and intermediate samples are representative of the sediment that would be removed during the course of the proposed channel dredging, and deep samples are representative of the channel and sediment surface that would be exposed to the benthic environment after the completion of dredging operations.

When AES's data was added to the data collected for the BWI Permit, which covered the same approximate area as proposed to be dredged by AES, and data collected by the Maryland Port Administration ("MPA") in late-2006[4], which was performed at the request of the LNG Opposition Team in the area proposed to be dredged by AES, there was one sample for every 231,000 CY (five times better sample-to-volume ratio than required for the BWI Permit), and distributed over 117 acres (nine times better sample-to-area ratio than required for the BWI Permit due to 40 percent less acreage to be dredged than was allowed under the BWI Permit). The new data supplied with the supplemental filing increased those comparisons to 13 times better on a sample-to-volume ratio and 20 times better on a sample-to-area ratio as shown in Table 2-1.

2.3.2.1 Core Sampling Locations

Locations of the vibracore drilling and sampling associated with the most recent field work are shown on Figure 2-1. During the sampling event, 12 locations were cored; the locations were requested by the ACOE and EPA to be "randomly" determined with three vibracore locations each apportioned to four areas subdivided from the overall dredge area footprint. The subdivision of these areas was as described in the ACOE letter to AES dated July 3, 2007. To identify a random distribution of the vibracore locations, the proposed dredge area was divided into the four segments prescribed by ACOE:

- Outer approach channel
- Turning basin
- North side of Pier 1
- South side of Pier 1.

A 100 foot by 100 foot grid was overlain on each of the four prescribed dredge segments. The ACOE comment directed that sample locations should be selected randomly within each segment. To accomplish this, potential sample locations (nodes) were identified at the center of each 100 foot square; each node in each segment was labeled with a unique node number. For each segment, three separate

[4] MPA collected four samples composited from 12 cored sample locations (three core locations were composited for each individual sample submitted to the laboratory). These samples were analyzed for VOCs, SVOCs, metals, pesticides and PCBs, and water analyses were also performed. The results indicated detections of a wider variety of compounds, including organic compounds, than had originally been reported in the BWI Permit application; however, evaluation of the results by the MPA, summarized in an MPA memo dated November 7, 2006, concluded that the material to be dredged was consistent with sediment quality found elsewhere in the Port of Baltimore, and that dredging would not result in water quality impacts.

sampling locations were selected by using random number generation to identify the three node numbers within each segment that would comprise the randomly-selected sample locations. Figure 2-1 shows the twelve randomly selected locations determined by this method.

At the 12 vibracore locations, bathymetry varies, therefore the amount of core actually needed to reach the target dredge depth of 45 feet below MLLW also varied. In some locations, all three targeted sample intervals were represented (shallow, intermediate and deep), and in other areas of greater water depth, only the bottom-most interval would be penetrated in the core sampling operation. In total, based on the site bathymetry 28 sediment samples were collected for off-site laboratory analysis; of these 28 samples twelve were collected in the shallow zone (or interval), four from the intermediate zone, and twelve from the deep zone. .

2.3.2.2 Sample Analyses Performed

Samples were collected via vibracore sampling methods to recover representative, undisturbed sub-bottom sediment samples. Samples were collected within new, clean lexan liners within the vibracore sample tubes. Upon recovery, the cores were examined by an experienced geoscientist, sample logs were prepared, and samples were selected from the appropriate sample intervals and placed in new, clean, laboratory-supplied sample jars. Samples were transported under chain-of-custody procedures to a Maryland-certified on shore laboratory, Caliber Analytical Services located in Towson, Maryland, for analysis using EPA analytical procedures appropriate to the analytes of interest. Specifically, VOCs were determined using EPA Method 8260B, semi-VOC concentrations were determined using EPA Method 8270C, and chlorinated pesticides were determined using EPA Method 8081A and PCBs were determined for shallow and intermediate samples using EPA Method 8082 while the PCBs for deep samples (representative of the proposed elevation) were determined utilizing the high resolution congener specific EPA Method 1668A for the NOAA 21 Congener List. Inorganic parameters including the priority pollutant metals and total cyanide which were analyzed in accordance with EPA Methods 6020A and 9012 respectively. Finally, additional parameters of analysis included tributyl tin by VIMS Method 338, TOC by ASTM Method D5373, and Cr^{6+} by EPA Method 7196A. Tributyl tin and hexavalent chromium, while not required analytes by ACOE Guidance for dredge material characterization, were analyzed based on community input received relative to sediment quality and industrial practices in the area.

2.3.2.3 Sediment Analytical Results

Table 2-2 presents a summary of the laboratory results for the shallow, intermediate, and deep interval samples. Results are also shown in a series of three figures attached, Figure 2-2, Figure 2-3, and Figure 2-4 for the shallow, intermediate, and deep samples, respectively. The sampling results obtained by AES were compared with NOAA screening values for chemical compounds in sediment that may result in an observable toxicity effect on marine biota. On Figures 2-2, 2-3 and 2-4, the samples with detectable compounds are presented relative to Marine Sediment Guidelines from the NOAA SQUIRT values. See reference for Buchman 1999.

If a compound was both detected and exceeded a SQUIRT guideline, it is shown relative to its associated vibracore boring location. Note that PCBs in the shallow and intermediate intervals were analyzed using EPA Method 8082, appropriate for evaluation of PCB content for the dredge material to be removed. The primary detected compounds are PAHs and metals. By comparing the detected compounds for those that exceed the SQUIRT values, it is evident that both the concentration and number of PAH and metals detections diminish to a point of no SQUIRT exceedances in the deep sediments for PAH compounds and reduced levels of metals. With specific regard to PAHs, the concentrations detected tended to be in the part-per-billion to part-per-million range, which is consistent with data from this same area associated with past dredge sampling, and consistent with other areas in the Port of Baltimore area (see further discussion on this below).

In summary:

- VOCs and pesticides were not detected in any of the sediment samples collected.

- PAHs (included with the semi-volatile analyses) were detected in six of the twelve sediment samples collected from the shallow sampling interval (HA-117, HA-118, HA-120, HA-121, HA-123 and HA-124); however, PAHs were not detected in the intermediate sample interval and only one PAH criteria exceedance was detected in the Deep sample interval at vibracore location HA-126. The PAH compounds detected include Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i)perylene Benzo(b)fluoranthene, Benzo(k)fluoranthene, Bis(2-ethylhexl)phthalate, Dibenz(a,h)anthracene)Di-n-octyl phthalate, Fluoranthrene, Isophorone, Napthalene, Phenanthrene and Pyrene. The levels of PAHs detected ranged from 270 to 3400 parts per billion, actual values for each detection are presented in Table 2-2. PAH concentrations detected in the August 2007 vibracore samples tended to be higher than those reported for Baltimore Harbor Anchorages and Channels (ACOE, 1997), but consistent with or lower for several PAH compound concentrations documented in the MDE Baltimore Harbor/Patapsco River/Back River study (ACOE 1997), the sampling performed for the Sparrows Point Marine Channel (EA Engineering Science, 1985) and the sampling performed during the June 2006 AES sediment sampling event.

- With specific regard to metals, concentrations of several metals were detected in each of the vibracore locations at varying sampling intervals. Metals detected at concentrations in excess of the Apparent Effects Threshold included arsenic, barium, chromium, copper, lead mercury and selenium. As with the PAH trend, the concentrations of detected metals decreased with depth of sample (i.e., shallow results were higher than intermediate and deep results). The concentrations of metals detected tended to be in the part-per-million range, again consistent with area data associated with historic dredge sampling and agency investigations of the Port of Baltimore (see further discussion on this below). The removal of the shallow and intermediate zones will result in removal of the majority of metal concentrations. The barium concentration at vibracore locations HA-116, HA-117, HA-118, HA-119, HA-120 and HA-121 will remain above the Apparent Effects Threshold as will the chromium concentration at vibracore location HA-117. However the majority of these concentrations will be reduced by over 30 percent at each location.

- PCBs in the form of Aroclor 1260 were detected at levels ranging from 0.15 to 0.22 mg/kg in the shallow interval of three vibracore locations HA118, HA120, and HA122 which slightly exceed the NOAA Apparent Effects Threshold limit of 0.13 mg/kg.

- Congener specific PCB analysis was performed utilizing EPA Method 1668A with ultra-low PCB detection limits for comparison to the NOAA SQUIRT criteria. PCB congeners were detected in each of the twelve deep samples that were analyzed. The concentrations were in the parts per trillion range for each PCB congener that was detected. Per NOAA Technical Memorandum NMFS-NE-157, the sum of concentrations of the 18 PCB congeners was multiplied by two to generate an approximation of “Aroclor-based” total PCB data for comparison with the SQUIRT criteria. The resulting total PCB congener values were in the parts per trillion range, all below the Apparent Effects Threshold criteria of 3.6 parts per million.

- The results of the analyses conducted for dioxins are contained in Table 2-2 and 2-3. Concentrations detected were all low, in the part-per-trillion range, and are consistent with values reported in literature for the Baltimore and Chesapeake Bay area, and believed to be a result of atmospheric deposition (Derrick, et. al., 2001; Van den Burg, et al, 2006). The data have been listed by individual compound; however, aggregate toxicity is represented by calculating a single value for all dioxins combined in terms of the most toxic dioxin congener 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) based on the World Health Organization Toxic Equivalency Factors for Fish (Van den Berg, et al 2006). Based on this comparison, no intermediate samples exceed the Apparent Effects Threshold included in the SQUIRT, the threshold where effects on marine biological organisms may be expected. See Buchman, 1999). Two samples one in vibracore boring HA-120 shallow sampling interval and the other in HA 121 deep sampling interval (see Figure 2-1 for location) exceeded the Apparent Effects Threshold of 3.6 parts per trillion. The total dioxin toxic equivalents detected at the HA-120 shallow sample interval was 5.40 PPT and the total dioxin toxic equivalents detected at the HA-121 deep sample was 5.05 PPT. This indicates there will be a net positive improvement in dioxin concentrations in the proposed dredge area as a result of the removal. Additionally, as stated in the NOAA SQUIRTs, the criteria were developed for screening purposes only and no represent official NOAA criteria nor do they constitute clean up criteria.

- Out of 28 sediment sample analyses conducted using VIMS Method 338, tributyltin was detected in six shallow sediment samples at concentrations ranging from 5 to 87 parts per billion with one single data outlier (HA-123) at 1.9 parts per million. Tributyltin was also detected in one deep sample (HA-122) at a concentration of 68 parts per billion. Neither an apparent effects threshold nor a clean-up criteria for tributyltin in sediment and/or soil have been established at the Federal level or in the state of Maryland. .

Additionally, as requested by ACOE and EPA, AES performed elutriate testing for each depth interval at each sampling area, resulting in a total of twenty four elutriate samples. The sampling technique directly measures constituent concentrations in the elutriate water, more realistically reflecting conditions in the water column that may result from exposure of contaminant-containing sediments to the water color during dredging. VOCs were determined using EPA Method 8260B, semi-VOC concentrations were determined using EPA Method 8270C, and chlorinated pesticides were determined using EPA Method 8081A and PCBs were determined for shallow and intermediate samples using EPA Method 8082. Inorganic parameters including the priority pollutant metals and total cyanide were analyzed in accordance with EPA Methods 6020A and 9012, respectively. Additional parameters of analysis included tributyl tin by VIMS Method 338, TOC by ASTM Method D5373, and hexavalent chromium by EPA Method 7196A. Tributyl tin and hexavalent chromium, while not required analytes by ACOE Guidance for dredge material characterization, were analyzed based on community input received relative to sediment quality and industrial practices in the area.

Elutriate data collected were generated for twenty four sets of sediment composites (results reported in Table 2-3). When compared against both acute and chronic marine water quality criteria, the elutriate data indicate that minimal water quality impacts may be possible from only two heavy metal contaminants that were detected slightly above water quality standards. Additionally, tributyltin was detected above the regulatory threshold in one sample (HA-123 shallow interval) where the exceedance was 1 part per billion. Because the tributyltin was not detected in the deep elutriate sample interval at this location (14-16 feet), the removal of the shallow sediments during dredging operations will improve bottom sediment conditions by eliminating the possibility of remobilization.

2.3.3 Analytical Comparison of Sediment Sampling Events

A comparison of the June 2006 and August 2007 vibracore sampling event data shows that the data collected from the August 2007 event directly correlates to the information presented to the ACOE, MDNR, MDE, and FERC in the various permit application materials submitted to those agencies in January 2007. Specifically, the PAHs and metals detected during the August 2007 event are within the same range of those constituents detected during the June 2006 sampling event as well as other historical dredge projects conducted in the Chesapeake Bay Area as presented in Table 2-4. The additional sampling performed by AES at the request of the ACOE confirms and further substantiates that the original classification of the sediment quality by AES in the proposed dredge area is accurate and comprehensive.

In summary, the data illustrates that the highest concentrations of chemical constituents, primarily semi-volatile PAHs and heavy metals, are found in the shallow, fine-grained sediments with high organic carbon content that accumulate in low-energy depositional areas that tend to be close to the shore. Constituent concentrations generally decrease with depth at all locations, and decrease with distance from shore. The depth range of sediments with elevated constituent concentrations also appears to decrease further away from the shore, consistent with net import and deposition of fine-grained sediments close to the shore, rather than net scour and export of these sediments.

Overall, the analytical data is consistent with the prior data collected and analyzed for the dredging proposed by AES. The results indicate that the removal of the shallow and some of the intermediate sediment during dredging operations should improve bottom sediment conditions in the areas where dredging is planned.

2.4 Air Quality

2.4.1 Climate/Meteorology

Air quality information is provided herein to establish a basis for evaluation of the air emissions that may result from dredge performance for the Project. Air impact analysis for the overall project were completed and contained in Resource Report 9, *Air and Noise Quality*, submitted to the FERC, and included specific analysis of construction air emissions associated with conduct of dredging, related dredge material processing, and PDM hauling to disposition location(s) assuming conservative haul distances.

The Chesapeake Bay, Delaware Bay and the Atlantic Ocean farther to the east generally give mild winters and summers to the portion of the Project Area encompassing the LNG Terminal and much of the Pipeline. Although some of the Pipeline is located further inland and would be less moderated by the effects of the Chesapeake and Delaware Bays, climatologically statistics for Baltimore are considered generally representative of the climate of the entire Project Area.

According to NOAA, typical January daily temperatures range from a minimum of 23.4 degrees Fahrenheit (ºF) to a maximum of 40.2ºF for the Project Area. July temperatures typically range from a minimum of 66.8ºF to a maximum of 87.2ºF. The record minimum and maximum temperatures are -7ºF and 105ºF, respectively. Typical morning relative humidity ranges from a low of about 70 percent in the winter to a high of about 85 percent in the early fall. Afternoon relative humidity is generally about 55 percent. The annual average precipitation is about 41 inches and is evenly distributed throughout the year. About one-third of the days have precipitation totaling 0.01 inches or more. Winter precipitation is generally associated with sub-mesoscale weather systems. The average snowfall is about 20 inches per year. Summer precipitation tends to be associated with thunderstorms. During the summer, the region is generally under the influence of the Bermuda high-pressure system. High-pressure systems are typically associated with low winds and increased potential for air quality problems.

The prevailing wind direction is generally from the west northwest in the Baltimore area. A southwest component becomes evident in winds during the warmer months while a northwest component is characteristic of the colder months.

2.4.1.1 Ambient Air Quality Standards

EPA has established primary and secondary national ambient air quality standards for certain air pollutant emissions, including carbon monoxide (“CO”), lead, nitrogen dioxide (“NO_2”), ozone, particulate matter less than 10 microns (“PM_{10}”), particulate matter less than 2.5 microns (“$PM_{2.5}$”) and sulfur dioxide (“SO_2”), which are referred to under the Clean Air Act as "criteria pollutants." National Ambient Air Quality Standards (“NAAQS”) have been established for each of the criteria pollutants. Standards are designated as primary or secondary. Primary standards are set at levels designed to protect public health. Secondary standards are set to protect welfare values such as vegetation, visibility and property values. States are free to adopt standards more stringent than the NAAQS. Maryland and Pennsylvania have adopted all of the NAAQS.

2.4.1.2 Ambient Air Quality Attainment Status

The LNG Terminal is proposed to be located in Baltimore County, Maryland. Baltimore County and Harford County are contained in the Metropolitan Baltimore Intrastate Air Quality Control Region (AQCR 115). The EPA has designated these AQCRs as being either in attainment with the NAAQS or unclassifiable/attainment for certain criteria air pollutants, including SO_2, CO, and NO_2. With respect to the one-hour ozone (“O_3”) standard (revoked as of June 25, 2005), the Metropolitan Baltimore, Eastern Shore AQCR and the Metropolitan Philadelphia AQCR are classified as severe-15 non-attainment, whereas the South Central Pennsylvania AQCR is classified as marginal non-attainment. With respect to the new 8-hour ozone standard, both of the Maryland AQCRs and the Metropolitan Philadelphia AQCR are classified as moderate non-attainment. All four Project Area AQCRs have either not been classified or are unclassifiable/attainment for particulate matter less than 10 micrometers (“PM_{10}”) and lead (“Pb”). For $PM_{2.5}$, all of the Project Area AQCRs have been classified as non-attainment, with the exception of the Eastern Shore AQCR, which is unclassifiable/attainment.[5] For Total Suspended Particulate (“TSP”), portions of the Metropolitan Baltimore AQCR that potentially include part of the Pipeline route have been classified as nonattainment. The Eastern Shore AQCR in Maryland has been classified as better than national standards with respect to TSP. Although TSP attainment designations are listed in 40 CFR 81, there no longer are TSP NAAQS and TSP-directed State Implementation Plan (“SIP”) programs. EPA revised the primary and secondary NAAQS for particulate matter on July 1, 1987 by eliminating TSP as the indicator for the NAAQS and replacing it with the PM_{10} indicator.

Because each of the Project Area AQCRs is classified as non-attainment with respect to the old one-hour ozone standard and had 1-hour design values greater than or equal to 0.121 PPM, they are categorized as "subpart 2" non-attainment with respect to the new 8-hour ozone standard. As such, each of the AQCRs is subject to specific requirements that must be incorporated into State Implementation Plans (“SIP”) for attaining the national ozone air quality standards. In addition, Maryland and Pennsylvania are considered part of the Ozone Transport Region (“OTR”). The OTR encompasses eleven northeast states and the District of Columbia, all of which have at least some areas not meeting the NAAQS for ozone. Because ozone attainment is a region-wide problem involving interstate transport of ozone precursors, projects locating in all areas within the OTR must meet more stringent non-attainment new source review requirements. The applicable emissions thresholds triggering major new source review in the Metropolitan Baltimore Intrastate AQCR are 25 tons per year (“TPY”) for either volatile organic

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[5] Effective December 18, 2006, EPA revised the 24-hour $PM_{2.5}$ NAAQS from 65 to 35 µg/m^3 and revoked the 24-hour PM_{10} NAAQS. Therefore, revised nonattainment designations are pending based on review of monitored $PM_{2.5}$ 24-hour ambient data in comparison to the revised NAAQS.

compounds (“VOC”) or nitrogen oxides (“NO_X”). New stationary sources with the potential to emit VOC or NO_X above these thresholds would be classified as Major Stationary Sources subject to more stringent Non-attainment New Source Review (“NNSR”) requirements.

2.4.1.3 Existing Ambient Air Quality Monitoring Data

The MDE and Pennsylvania Department of Environmental Protection (PDEP) monitor ambient concentrations of certain criteria pollutants at a number of monitoring stations located in the Project Area AQCRs. The monitored data, which are available from EPA’s AirData website (http://www.epa.gov/air/data/reports.html), were evaluated to determine representative air quality levels for the Project Area. Monitoring stations with closest proximity to the Project Area are located in Baltimore County, Harford County, and Cecil County in Maryland and in Lancaster, Chester, Delaware and Montgomery Counties in Pennsylvania. The monitoring data demonstrates that all monitored pollutants are meeting the NAAQS, with the exception of one-hour and 8-hour average ozone concentrations in all four Project Area AQCRs and annual average $PM_{2.5}$ concentrations in Baltimore County in Maryland and Chester and Lancaster Counties in Pennsylvania.

3. DREDGING

3.1 Location and Volume

Dredge equipment and support vessels (tugs and fuel tenders) will be mobilized to the Terminal Site along with aboveground storage tanks for fuel oil storage during the initial stages of site preparation. The fuel storage tanks will arrive in a ready for placement condition and will be installed and secured according to manufacturer's recommendation.

Construction of the LNG Terminal will include widening and deepening the existing approach channel and turning basin offshore of the Terminal Site to accommodate the LNG ships expected at the LNG Terminal, which will be larger than the ships that have utilized the existing shipyard, floating dry dock and graving yard/coal channel (south of the proposed Terminal Site) to date.

The Brewerton Channel, the existing approach channel, and certain areas offshore of the proposed Terminal Site, have been dredged in the past and currently are the subject of dredging permits issued by the ACOE and a Water Quality Certification from the State of Maryland, allowing the performance of dredging using either hydraulic or mechanical techniques. Dredging of the approach channel and areas offshore of the proposed Terminal Site is allowed under these existing permits for maintenance and waterfront operations, to a depth of 39 feet below MLLW. In addition, on May 6, 2005, the ACOE issued the BWI Permit that specifically allowed the following:

- Mechanical or hydraulic dredging of a channel, turning basin, and berthing areas to -39 feet MLLW;
- Placement of approximately 600,000 CY of dredge material at the Hart-Miller Island disposal site; and
- Installation of sheet piling and construction of fendering systems.

The permit also approved a subsequent phase, consisting of the deposit of approximately 2.6 million CY of dredge material at disposal sites yet to be determined. The near-shore dredging approved under the BWI Permit overlaps almost entirely the near-shore dredging proposed by AES.

As described above, actual volume to be dredged and material handling requirements may be less than discussed by this Consolidated Dredge Plan depending on bathymetric configuration of this area at the time of LNG Terminal construction. The approach envisioned here has been developed to anticipate dredge operations based on current bathymetry (i.e., bathymetry as of January 2007). AES has also allowed for methods that may be needed if dredge volumes are greater than projected, and/or if the environmental quality of dredge material in sections of the dredge area is degraded relative to currently permitted dredge materials. AES will follow procedures for dredge performance consistent with recent past dredge approvals for this location, as updated based on data collected for this project. AES has analyzed the existing sediment conditions in the proposed dredge area. Additionally, AES has evaluated past dredge practices, recently approved dredge permits (including the BWI Permit and other permits issued for activities in the Port of Baltimore), existing dredge technology, anticipated impacts, and proposed mitigation strategies, as described in Section 2.4.8 of Resource Report 2, *Water Use and Quality*, of the FERC filing.

The approach channel expansions will be performed primarily by use of mechanical clamshell dredge, with some limited areas near shore excavated by backhoe dredge. For the reasons discussed in more detail in Section 3.4, AES intends to use conventional mechanical dredge techniques because chemical analyses obtained for dredge planning indicate sediment quality is not any more degraded than is allowed by current dredge permits both in the immediate area proposed to be dredged and in other areas of the Port of Baltimore where conditions are more impaired. The limits of the existing approach channel and turning basin, and proposed expansion area, are shown on Figure 1-1. A summary of the dredging proposed, and establishment of the recycling facility appear below.

3.2 Dredging Operations

Dredging associated with the LNG Terminal is anticipated to begin in the berthing area, and progress in reaches towards the outer channel to allow for earlier commencement of pier/dock construction operations. The anticipated limits of the area to be dredged are shown on Figure 1-1. Assuming the anticipated dredged channel and turning basin depth of 45 feet, below MLLW it is estimated that approximately 3.5 to 4.0-million CY of dredged material will be generated for recycling. Maintenance dredging under current permits issued to others may decrease this amount somewhat, depending on the amount of dredging performed prior to LNG Terminal construction in areas of overlap.

3.2.1 Pre-Dredge Activities

Prior to field mobilization, this Consolidated Dredging Plan will be updated and/or supplemented with current information regarding precise dredge layout, equipment specifications, procedures, operator qualifications, and any other information required by jurisdictional permitting agencies. An updated bathymetric survey will be performed prior to commencement of dredging operations and located according to a site datum. Updated and/or supplemented dredge operations and precautions are assumed to be as stringent as those approved for the maintenance dredging approved for the current shipyard operations. The Dredge Plan elements will include the criteria and procedures set forth below (as modified based on updated data):

1. Qualifications and experience of dredging personnel.

2. Specifications for navigational equipment and monitoring instrumentation.

3. Specifications for proposed dredging equipment, including, as may be applicable, dredge type, depth capability and accuracy, dredge platform dimensions and working draft, and proposed dredge material handling.

4. A drawing showing the width, length, and location of the dredge lanes and target elevations in each lane.

5. Proposed cycle time (dredge rates).

6. Dredge barge movement procedure and frequency.

7. Proposed cut or bite height relative to sediment thickness.

8. If necessary, based on results of analyses of sediment and amount of material dredging performed under existing maintenance permits, turbidity curtains may be required. The number, relative location, and stabilization control design details of turbidity curtains deployed to control sediment that may be re-suspended during dredging will be planned.

9. Updated procedures for sediment transport, unloading, and handling.

10. Spill containment design and procedures.

11. General dredging approach, and means to deal with variable water depth and sediment thickness.

12. Use of specialized services such as divers (if needed).

13. Means to be employed to minimize potential re-suspension of sediment (consistent with type of dredging to be performed – mechanical or environmental bucket)

14. Means to remove aquatic vegetation (if needed)

15. Means to remove debris.

16. Means to control and accurately document position of dredge and prevent over-dredging.

17. Means to minimize the potential effect of wind and waves on dredging precision.

The type of dredge equipment selected for the Project will be determined based on the physical and chemical composition of the sediments to be dredged. For soft sediment (silt / softer sand deposits) an environmental bucket will provide similar production rates to a standard clamshell bucket (within 5 percent). However, for hard sediment (sand and clay), which makes up 75 percent or more of the total volume of this Project, an environmental bucket will not be able to dig this sediment. A conventional dredging bucket or backhoe type dredge plant will be required to effectively remove this material.

3.2.2 Dredging Performance

A directional Global Positioning System ("GPS") will be used to locate the existing and proposed channel limits and to identify shoaled areas. An electronic tide gauge will be used to determine proper depths of dredging. The dredge contractor will use electronic position fixing equipment to provide accurate real-time control of the dredge lateral and vertical position in the project's co-ordinate system or State Plane Coordinate System while dredge preparation and operations are underway. Maximum accuracy of positioning shall be ±2 feet for horizontal (x, y) and ±0. 5 feet (6 inches) for vertical (z). An on-line graphics display of position and a hard copy capability will be required. The contractor's electronic positioning system must be accessible to the Project Engineer or designated representative upon request. It must provide a continuous automatic update and logging of position. The positioning system used will also be compatible with the project's coordinate system and is subject to the Project Engineer's approval.

Sediment will be removed to the design depth of 45 feet below MLLW, including material removed from the allowable over-depth as needed to achieve the intended grade. Dredging associated with the project is anticipated to begin in the berthing area, and progress in reaches towards the outer channel to allow for earlier commencement of pier/dock construction operations.

As previously noted, dredging will be conducted utilizing a mechanical (clamshell) dredge. Dredge positioning will be controlled by use of a directional GPS real-time kinematic ("RTK") control system providing for control of the bucket digging position.

After loading, each hopper scow will be towed by tugboat to the DMRF, unless the material is suitable for direct shipment to an alternate location for re-use. Dredging production is expected to be up to 10,000 CY per day and last approximately 18 to 24 months depending on seasonal restrictions associated with permits for dredging. Specific factors to be controlled in the dredge process to ensure effective and environmentally compatible dredge operations are as follows:

3.2.3 Crane Capability and Operation

A primary factor affecting dredging success is the crane's vertical depth control capabilities because lift depths are limited only by the crane size and the amount of cable on the drum. Power-up and power-down capabilities may both be required to provide optimal depth control. Freefall of the bucket in the water column may create excess turbidity when the bucket reaches the bottom and will be avoided. A reduced and controlled lowering speed is recommended for all dredge operations.

3.2.4 Overlap Allowances

Bucket overlap will vary with site conditions, but some must be performed to ensure complete coverage. Bucket overlap is a physical operation controlled by the crane operator using the positioning software and adjusting to account for the bottom slope. After removing the first bucket on each swing radius, subsequent buckets are overlapped to ensure proper coverage. With proper overlap, each bucket is filled, but not overfilled, when the target depth is achieved.

3.2.5 Avoiding Excess Water and Debris

Excess water is to be avoided when performing precision dredging. A properly filled and full bucket (per the procedures above) will generate minimum water. The target depth at the final stage necessary to meet final project depth (grade) could be several inches less than necessary to fill the bucket. The project contractor will be required to have the capability to handle excess water.

The dredge material will be transferred to a hopper barge to settle. The water that results from dredging operations will be contained on the hopper barges for batch discharge. The water will be treated utilizing filtration and then tested for conformance to permit requirements prior to discharge in accordance with project permits. In the event that the water quality is not acceptable prior to discharge and cannot be made acceptable through reasonable treatment then it will be removed for treatment and disposal at a permitted facility.

3.2.6 Operator Qualifications

Operator qualifications and operational experience will be reviewed to determine capability of performing the following tasks:

1. Using GPS positioning and dredging software to accurately place the bucket at the desired position, overlapping the edge of the previous bucket as appropriate;

2. Slowly lowering the bucket to a target depth;

3. Closing the bucket (and for environmental bucket operations, monitoring contact switches that indicate bucket closure);

4. Following project procedures for handling obstructions if rocks or debris prevent the bucket from closing;

5. Moving a partially submerged bucket to a common lift area and/or into a secondary submerged containment vessel (if environmental bucket procedures are required);

6. Discharging the sediment in a manner that avoids excessive splashing and spillage;

7. If environmental bucket procedures are required, placing the emptied bucket in a dip tank to remove most of the adhering sediment before returning for the next bucket.

3.2.7 Dredge Material Movement

Full-time tugboats will be used to tend the dredge and for the switching of equipment and shuttling of work scows to the DMRF. It is anticipated that ten to fourteen 1,500 to 3,500 CY work scows will be assigned to the project for dredged material transport. All scows and containers will be of solid hull construction and will be completely sealed and watertight in order to avoid any release of dredge material.

Dredging will be conducted utilizing a mechanical (clamshell) dredge, or if conditions warrant, with an environmental bucket or suitable alternative if required by permit condition, as described in Section 2.4.8 of Resource Report 2, *Water Use and Quality*, and summarized here. A directional GPS will be used to locate the channel limits and to identify shoaled areas. Sediment will be removed to the design depth of 45 feet below MLLW. Computer-controlled recording software will track the progress of the dredging and will ensure complete coverage of the area to be dredged.

Dredging production is expected to be up to 10,000 CY per day, and operations are expected to last approximately 24 months. It is anticipated that ten to fourteen 1,500 to 3,500-CY work scows will be used. All scows and containers will be of solid hull construction, and will be completely sealed and watertight in order to avoid any release of dredge material.

Additionally, AES is proposing to excavate approximately 67,332 square feet of near shore area using a dredge vessel, barge mounted backhoe excavator, an on-land backhoe excavator, or a combination thereof. The existing seabed in the Pier 2 area ranges from approximately 15 to 20 feet below MLLW. Conservatively assuming a base elevation of 15 feet below MLLW for the removal area and a final target elevation of 45 feet below MLLW, it is calculated that approximately 74,813 CY of material may be removed from the Pier 2 area. The dredge method for each area as well as final volume estimates will be confirmed during final design, and will be submitted to the appropriate agencies when complete.

The existing Pier 2 structure is supported by a series of vertical and battered piles.

The materials that are to be dredged from the areas adjacent to Pier 2 will be loaded onto a dewatering scow and managed and processed at the DMRF in the same manner as the other dredged materials

3.3 Timeframe/Schedule

The Project will be constructed in accordance with applicable governmental regulations, permits, and approvals. Construction methods will be those that are consistent with industry-recognized practices, company policies, and Best Management Practice plans ("BMPs"). More detailed descriptions of construction methods will be prepared in construction specifications and drawings prior to the commencement of work. A preliminary construction schedule is presented in Table 3-1.

3.4 Dredge Technology and Controls

Dredging will be conducted utilizing a mechanical (clamshell) dredge rather than by hydraulic means or with use of an environmental bucket.[6] A directional GPS will be used to locate the channel limits and to identify shoaled areas. Sediment will be removed to the design depth of 45 feet below MLLW. Computer-controlled recording software will track the progress of the dredging and will ensure complete coverage of the area to be dredged.

Project-specific factors such as bathymetry, wave energy, equipment availability, and physical and chemical analysis of the sediments to be dredged all influence the selection of dredging methodology. The physical and chemical characteristics of materials to be dredged also influence the determination of disposal methods. In general, environmental dredging techniques are employed where the level of chemical constituents present in the dredged material to be removed indicate a potential for unacceptable risk for adverse environmental or human health effects from the dredging process. For the dredging proposed by AES, both the recent extensive characterizations performed by AES, including elutriate testing, and background data indicate that the dredging will encounter both recently deposited (Holocene) sediments as well as underlying "native" sand materials that are not expected to negatively impact the environment or human health.[7]

Dredging production is expected to be up to 10,000 CY per day and last approximately 24 months, with accommodation being made for required work stoppage periods. It is anticipated that 10 to 14 1,500 to 3,500 CY work scows will be assigned to the Project for dredged material transport. All scows and containers will be of solid hull construction, and will be completely sealed and watertight in order to avoid any release of dredge material.

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[6] In general, the use of an environmental bucket (equipped with vents, gaskets, and covers) or equivalent would be used if necessary to minimize the re-suspension of sediments into the water column during dredging (and if contaminant residuals are present at unacceptable levels in the sediment, as determined by chemical analyses cited herein)

[7] It should also be pointed out that environmental dredging methods may be used only for the overlying sediment layer in areas where results of physical and/or chemical characterization of the sediments indicates the need for use of such methods. Thus, even if AES were to voluntarily introduce a new standard of dredge technology into the Port of Baltimore, it would be possible to use the technology only on the top layer of sediments due to the composition of the deeper sediments.

4. DREDGE MATERIAL RECYCLING FACILITY

4.1 Process Description

As part of the construction phase, AES will construct the DMRF adjacent to the existing waterway at the Terminal Site. This phase will precede actual dredging operations. The purpose of the DMRF is to process material excavated from the water bottom into one or more useful products that will be temporarily stored in a new location near the DMRF until transferred to the ultimate end users of the new product(s). Operation of the DMRF will not require onshore or unconfined placement of any dredge materials.

The 10,000 CY per day DMRF will occupy approximately five acres of the 15 acres of upland property located immediately to the south of the Terminal Site (see Figures 1-5 and 1-6). The DMRF will consist of two systems processing in parallel, each of which will include hoppers, conveyors, pugmills for mixing additives, and stacking equipment. Emissions from each pugmill and additive delivery system will be equipped with and controlled by separate baghouse dust-collection devices.

Existing site roadways will be used to transport the PDM from the pugmill processing system to the temporary PDM storage area. The temporary PDM storage area will consist of an approximately 10-acre area (within the 15-acre upland area) covered by bituminous paving, or lined with a 10-mil high density polyethylene ("HDPE") liner covered by 6- to 12 inches of existing site soil or imported soil. An additional area, approximately 20 acres in size, is available for use as a contractor yard for LNG Terminal construction or to support the DMRF facility, as needed for PDM or equipment storage. If utilized to support the DMRF operations, the site will be prepared consistent with the description above (e.g., paved, stormwater controls, etc). This 20-acre area is located north of the Terminal Site as shown (labeled Temporary Equipment Laydown and Storage Yard) on Figure 3-1,. A scale house and truck scale will be located adjacent to the temporary PDM storage area for weighing of the outbound shipments of the PDM product upon sale. Existing site roadways will be used for outbound shipments of the PDM product.

The storage area at the DMRF (graving dock location) will be capable of storing up to 192,000 CY of processed dredged material. The additional storage area will be capable of storing up to 640,000 CY of processed dredged material. Due to variability in both physical and chemical characteristics of the dredged material that will be generated from this project, some dredged material will have little or no admixture added through the DMRF (i.e., some material is not anticipated to show detectable contaminants and will be of sufficient grain size to be immediately useable following the dewatering process). This may allow for increases in equipment throughput capacity; alternatively, if more add mix is required, it may reduce output capacity. The average of 10,000 CY per day was used to represent the expected average capacity and duration of the project. Likewise, AES used the average of 5,000 CY per day being hauled away from the site over a 36-month period to estimate the expected truck volumes and emissions associated with those trucks over this period of time. In actuality, there will be times where the truck volumes may be slightly more or less depending on the actual volume to be removed or contracts and locations of end product users. Additionally, certain end product users may have rail or barge delivery access that would vary the amount of end product material transported from the Terminal Site on a daily basis.

After civil work is completed, the DMRF will be erected at the Terminal Site. All components of the processing systems will be fabricated off-site and delivered via truck to the construction site.

Operation of the DMRF will occur during the LNG Terminal construction phase, and processing will commence simultaneously with the commencement of dredging operations.

4.1.1 Dredge Material Processing

The initial step in processing dredged materials is the reduction of the water content of the dredged sediments. The proposed dewatering process would involve dewatering of loaded barges at the dredging site or the DMRF. Loaded scows would be allowed to settle so that the free-liquid portion would be visibly free of suspended sediments prior to pumping the decant water to the cargo area of a dedicated dewatering barge. After settling, the decant water will be discharged within the area of dredging after testing for suspended solids or as required by permits. Alternately, after the initial barge settling period, portable pumps will be utilized to pump the water to land based tanks (i.e. frac tanks) for additional settling. All decant water from dewatered dredged material at the DMRF will pass through a settling tank system and filter prior to discharge back to the harbor. Chemical and physical analysis will be conducted on the decant water in accordance with permit conditions that will be issued for the DMRF. Threshold values for discharge will be set forth in that permit. Following this secondary settling, the water will be filtered and discharged under applicable permit conditions. If chemical analysis indicates the presence of contaminants in the water, at concentrations in excess of allowable regulatory limits, options for onsite treatment prior to discharge or offsite treatment and disposal will be evaluated. If feasible, the water will be treated to meet applicable Federal, State and/or local standards prior to discharge. Alternatively, offsite disposal options may be utilized and include the local Publicly-Owned Treatment Works ("POTW") or a privately-operated treatment, storage, disposal ("TSD") facility. AES has identified three offsite facilities that would be able to accept the contaminated water, if required. These potential sites include Clean Harbors in Baltimore, Maryland; Veolia Environmental Services in York, Pennsylvania; and Waste Management Industrial Services in Crofton, Maryland.

After raking, the raw dredged material will be stevedored from the work barges directly into a pugmill processing system utilizing hydraulic excavator(s) equipped with hydraulic closed clamshell bucket(s). At no time will the raw dredged material be stored on the Terminal Site or elsewhere. The screened raw dredged material will be fed to a twin-shaft pugmill blending system and mixed with reagent admixtures. After mixing, the PDM will empty from the pugmill onto a radial stacking conveyor. The "radial stacker" can be positioned to load directly into trucks, or to stockpile the material for re-handling to trucks, railcars, or back to hopper scows.

Following processing, the PDM will be transported via on-site trucks to the designated staging area within the permitted temporary storage site. The PDM will be placed using hydraulic excavators, bulldozers and vibratory compactors into large stockpiles for temporary storage in inventory until the material is sold for beneficial use.

The PDM will be trans-loaded by wheel loaders or hydraulic excavators into road trucks for off-site shipment to ultimate destination sites. While dredging production and dredged material processing will be at a rate of up to 10,000 CY per day, transportation offsite of PDM will be at a rate of 5,000 CY per day. The schedule to remove PDM is twice as long as the schedule for dredging and processing. AES anticipates approximately 220 truck trips a day hauling PDM off-site (assuming 276 hauling days per year). This equates to approximately 5,500 tons of PDM shipped off-site daily, a mass flow balance is presented in Appendix D. Alternatively, PDM may be transported by rail car (capacity per rail car is approximately 98 to 108 tons), or a combination of trucking and rail car to its destination; each rail car would transport the same volume as four to five trucks.

Potential uses for the PDM include:

- Abandoned mine land and quarry reclamation;
- Brownfields redevelopment;
- Landfill capping and closure;
- Alternate grading materials;
- Low permeability cap layer in lieu of geo-membrane systems;
- Manufactured top soil;
- General structural and non-structural fill for commercial / industrial development; and
- Bulk construction fill, including site grading material and highway embankments.

All of the uses listed above have been demonstrated as both technically and commercially viable in other similarly-affected port/harbor sediments and settings, and regulatory jurisdictions. AES has received a written confirmation from two independent waste management corporations that their landfills can accommodate the volume of processed dredge material that will be generated by the Project. This material is categorized as a beneficial use (alternate daily cover) and not as solid waste therefore does not impact the total volume of waste accepted at each facility. Even if the material were to be considered a solid waste, the daily volume transported would be within the total capacity limits of the landfill locations that have indicated interest in and ability to accept the PDM. Letters of confirmation from two potential landfill locations are included in Appendix A. Final determination of the application(s) will be made prior to initiation of the dredging activities and will depend on market needs and conditions at that time. Because the Project proposed by AES is a private, non-governmental, venture, all costs associated with the dredging and delivery of the recycled product(s) will be carried by AES.

Other potential options for management of dredged material include off-site disposal and upland fill sites, as described in Section 10.5.2 of Resource Report 10, *Alternatives*. These potential options also depend on the chemical makeup of the dredged material, receipt of approvals from applicable agencies and, in some cases, approval by the receiving facility(s). These other alternatives are not currently considered to be as viable as the recycling alternative, and they are not as consistent with Maryland's long term goals for management of dredged material as the recycling option.

4.2 Site Layout

Typical site features are shown on Figure 4-1 including illustration of layout and location of facilities as well as an illustration of the portable frac tanks.

4.3 PDM Storage

The 10-acre PDM storage area at the DMRF (graving dock location) will be capable of storing up to approximately 192,000 CY of processed dredged material. The additional 20-acre PDM storage area will be capable of storing up to approximately 640,000 CY of processed dredged material. Due to variability in both physical and chemical characteristics of the dredged material that will be generated from this project, some dredged material will have little or no admixture added through the DMRF (i.e., some material is not anticipated to show detectable contaminants and will be of sufficient grain size to be useable following the dewatering process). This may allow for increases in equipment throughput capacity; alternatively, if more add mix is required, it may reduce output capacity. The average of 10,000 CY per day was used to represent the expected average capacity and duration of the project. Likewise, AES used the average of 5,500 CY per day being hauled away from the site over a conservatively estimated 36-month period (even though AES anticipates a 24-month shipping period) to estimate the expected truck volumes and emissions associated with those trucks over this period of time. In actuality, there will be times where the truck volumes may be slightly more or less depending on the actual volume to be removed or contracts and locations of end product users. Additionally, certain end product users may have rail or barge delivery access that would vary the amount of end product material transported from the Terminal Site on a daily basis.

To illustrate what types of material may or may not need processing and what types of admixtures might be used, AES has developed a dredged material recycling matrix (Appendix B). This matrix identifies potential beneficial use/upland disposal options based on both chemical and physical characteristics. The matrix also includes the expected ratios of admixtures that would be used (if necessary) to recycle the dredged material dependent upon these inherent characteristics of the dredged sediments and the proposed end uses.

AES expects that the entire 20 acres will be available for PDM storage when it is required. Initially, portions of this 20-acre site will be used for both equipment laydown as well as PDM storage. As the Project is built, equipment will be removed from this area and installed in the Project thereby freeing up additional area for PDM storage. This sequencing will ensure that the 20 acres in its entirety is available for PDM storage as required. With regard to the leasing or acquisition efforts for the 20-acre parcel, a letter from the owners of this property is included as Appendix C.

Using a volume estimate of 3.7 million CY of dredged material requiring removal and upland disposal over a two year time period, 1.85 million CY of dredged material will have to be removed, processed, and disposed annually. Using the dredging season of 243 days this equates to an average of approximately 7,613 CY of material delivered to the DMRF daily for offloading and processing. AES will ship PDM off site at an average rate of approximately 5,000 CY per day 365 days per year. Based on these rates, the maximum storage capacity required for dredged material will be equivalent to the maximum dredging days per season of 243 times the difference between dredging rate and shipment rate of 2,613 CY per day, or 634,959 CY. This material will be removed from the storage areas during the "no-dredge" window and prior to re-start of dredging. A 635,000 CY stockpile at 3:1 side slopes piled 20 feet high will require approximately 22.7 acres of space. A portion of the remaining 7.3 acres can be utilized for stormwater management.

4.3.1 Dewatering Controls

The BWI Sparrows LLC Shipyard ("BWI") currently holds a discharge permit under the National Pollutant Discharge Elimination System ("NPDES"), State Discharge Permit No. 97-DP-0398 (NPDES Permit MD0001180), which was reissued on August 30, 2006. The permit is for discharge of non-contact ballast waters, storm water, steam condensate, and air conditioning condensate. The facility discharges these waste waters through 17 outfalls to the waters of the State. BWI also discharges storm water runoff from "non-process" areas, including the 45 acres of upland proposed for use by AES, directly to the Patapsco River, in accordance with their permit conditions.

AES has applied for coverage for the LNG Terminal under the Maryland General Permit for Stormwater Discharge Associated with Industrial Activity. AES's design for the LNG Terminal includes appropriate stormwater controls, and will collect and direct all storm water on the property through appropriate treatment as needed to meet the stringent criteria applied and enforced by the State of Maryland for discharge under the General Permit. Any storm water that comes in contact with industrial process areas will be routed separately, treated prior to discharge, and discharged with process wastewater routed to the Baltimore County POTW. Discharges to the POTW will be permitted, monitored, and treated to meet the pre-treatment standards required by the Baltimore County POTW. The LNG Terminal will occupy approximately 45 acres of upland area on the BWI site. Approximately 50 percent of the site will categorized as process area in which the associated storm water runoff will be collected and treated on-site prior to discharge to the POTW. The redirection of the process area storm water runoff will result an approximately 50 percent reduction in storm water being discharged to the Patapsco River (an improvement well in excess of the 10 percent improvement required in Intensely Developed Areas per provisions of Maryland's Critical Area Act). In addition, the currently permitted discharges associated with the property to be developed for the LNG Terminal would be eliminated, resulting in water quality improvements associated with cessation of these outfalls.

Excess water will be removed from the raw dredged material prior to entering the receiving hopper. Dewatering of the loaded scows will occur at the dredging site. Jurisdictionally the dredging activity is reviewed under and all aspects are covered by the ACOE through issuance of a Section 10 permit (Rivers & Harbors Act) for dredging operation and a Clean Water Act Section 404 permit for the discharge of the clarified supernatant water to surface waters. Therefore, the release of supernatant discharge waters are exempted from NPDES regulation; the release is also reviewed under a Clean Water Act Section 401 Water Quality Certification which would be issued by the State of Maryland. At the dredging site, portable pumps will be utilized to remove decant water from the loaded scows. This water will be placed into a primary holding scow and allowed to settle for a period of 24 hours. The water will then be pumped off of the primary holding scow to a secondary holding scow. Again, the decant water will be allowed to settle for a period of 24 hours or until the total suspended solids content of the water is below a 75 PPM. The water will then be discharged from the holding scow back to the water at the dredging site.

Should dewatering of a loaded scow be required at the DMRF, a dewatering system will be available. Loaded scows would be allowed to settle so that the free-liquid portion would be visibly free of suspended sediments prior to pumping the decant water to the cargo area of a dedicated dewatering barge. After settling, the decant water from dewatered dredged material at the DMRF will pass through an on shore settling tank system consisting of 4 tanks with a capacity of 21,000 gallons each (i.e., portable frac tanks), and be filtered prior to discharge back to the Patapsco River. Chemical and physical analyses will be conducted on the decant water in accordance with a MDE Water Management Program Individual Permit for Industrial Water Discharge that will be issued for the DMRF. Threshold values for discharge will be set forth in that permit.

If necessary, the 21,000 gallon holding tanks can be pumped off into tanker trucks for transport and delivery to an offsite facility capable of treating wastewater that cannot be discharged under permit at the DMRF. Two such facilities are listed below:

Clean Harbors, Inc.
1910 Russell Street
Baltimore, MD 21230

AEG Environmental
P.O. Box 286
Westminster, MD 21158

As noted above, elutriate testing has been completed on the sediments proposed to be dredged by AES. The results of these analyses are presented in Resource Report 2, *Water Use and Quality*. The elutriate analyses are representative of the expected chemical characteristics of the dredged material decant water. The results indicate that the dredge materials decant water from scows or the DMRF is not expected to have an adverse impact on water quality.

Regarding monitoring of the decant water, the operation proposed by AES involves settling of the decant water in a dedicated dewatering scow(s) for a period of not less than 24 hours or until the total suspended solids content is demonstrated to be less than 75 mg/L. This method has been employed by dredgers under the regulatory oversight of the New Jersey Department of Environmental Protection ("NJDEP") and New York State Department of Environmental Conservation ("NYSDEC") for over seven years. When the NJDEP or NYSDEC issues a Federal Consistency Determination or Water Quality Certificate for dredging activities in the New York/New Jersey Harbor area that includes scow dewatering prior to upland processing of raw dredged material, the following conditions are typically included in the permit:

- *"All decant water holding scows shall be water tight and of solid hull construction and shall be moored at the (dredging project location)."*
- *"All decant water shall be held in the decant holding scow a minimum of 24 hours after the last addition of water to the decant holding scow prior to discharge to the (waters at the dredging project location)."*
- *"Should the (project sponsor), or its contractor, wish to reduce the required holding time, it must be demonstrated that the reduced holding time is sufficient to meet a total suspended solids (TSS) action level of 75mg/L. The total suspended solids shall be determined through gravimetric analysis. No discharge shall be permitted from the decant holding scow until the results of the gravimetric analysis have confirmed that the 75 mg/L action level has been achieved. No additional water shall be added to the decant holding scow between the time of sample acquisition and discharge. Upon successful demonstration that the reduced holding time is sufficient to meet the TSS action level of 75 mg/L, the monitoring of TSS may be suspended and the demonstrated settling time shall replace the 24 hour minimum. A successful demonstration of the reduced holding time efficiency shall be determined once three consecutive TSS analyses have confirmed that the 75 mg/L action level has been achieved by the reduced holding time, all records including time of last addition of decant water into the scow, time of TSS sampling and the results of TSS sampling shall be submitted to the (state regulatory agency) as soon as they become available, together with a request for a reduced holding time."*

AES proposes an identical approach to monitoring decant water prior to discharge. If testing results indicate that the decant water exhibits a TSS concentration less that 75 mg/L in a time period less than 24 hours on a consistent basis, AES may propose to reduce the required holding time for decant water prior to discharge.

4.3.2 Stormwater Control

The construction and operation of the DMRF will occur above the mean high water line and will have no adverse impacts to the waters of the United States. As proposed, the DMRF will be constructed completely on land. Storm water management during construction and operation will be covered under the Maryland General Permit for Storm Water Discharges Associated with Industrial Activity. AES will design the DMRF to comply with the requirements of the General Permit administered by MDE. The site's storm water controls will be developed during final design and incorporated into the Project's Storm Water Pollution Prevention Plan, which will be implemented at the DMRF and available for review by the agencies per the requirements of the General Permit.

During operation of the DMRF, dredged material requiring processing is offloaded from hopper scows and placed directly into the processing system. A spill plate will be in place to direct any overspilled material back to the hopper scow during the offloading process, thereby preventing material from re-entering waters of the United States.

Process flow diagrams demonstrating the typical DMRF layout are contained in Appendix A, which were originally provided to the ACOE with the January 2007 filing. The proposed DMRF layout is also shown in Figures 1-6 and 4-1 and the process flow diagram is presented in Figure 5-1. The DMRF is not proposed to be constructed in waters of the United States.

AES filed a Notice of Intent ("NOI") with MDE for coverage under the Maryland General Permit for Storm Water Discharges Associated with Industrial Activity. AES will design the DMRF to comply with the requirements of the General Permit administered by MDE. The site's storm water controls will be developed during final design and incorporated into the Project's Storm Water Pollution Prevention Plan, which will be implemented at the DMRF and available for review by the agencies per the requirements of the General Permit. Layout of the DMRF is described above, including features to prevent impact to waters of the United States.

5. PROCESSED DREDGE MATERIAL USE/DISPOSITION

5.1 Process Description

The initial step in processing the dredged material is the reduction of the water content of the dredged sediments. The proposed dewatering process would involve dewatering of loaded barges at the dredging site or the DMRF. Loaded scows would be allowed to settle as part of the process so that the free-liquid portion would be visibly free of suspended sediments prior to pumping the decant water to the cargo area of a dedicated dewatering barge. The dedicated dewatering barge will be moored in a separate area located within the general area of the Terminal Site. After settling the decant for up to 24 hours, the decant water will be discharged within the area of dredging after testing for suspended solids or as required and/or authorized by permits. Alternately, after the initial barge settling period, portable pumps will be utilized to pump the water to land based tanks (i.e.., frac tanks) for additional settling. Following this secondary settling, the water will be filtered and discharged under applicable permit conditions. As necessary, oversize debris will be removed from the barges using a conventional hydraulic excavator equipped with a rake or grapple. Separated debris will be recycled or disposed of at a permitted facility (see below).

After the raking portion of the process is completed, the raw dredged material will be stevedored from the work barges directly into the pugmill processing system utilizing hydraulic excavator(s) equipped with hydraulic closed clamshell bucket(s). The first step in the pugmill processing system involves use of a scalping unit that will actively screen the raw dredged material feed to a 4-inch minus cut. The unsuitable oversize material (debris) is separated and transfered to a concrete debris storage bunker. The screened raw dredged material feed falls directly into a receiving hopper that feeds a conveyor belt that delivers dredged material directly to a twin-shaft pugmill blending system. In the pugmill, the dredged material is mixed with reagent admixtures. Reagents or additives will be determined based on chemical analyses performed in dredge planning and/or as material is produced. Note that reagent/additive mixtures may be varied in order to render different consistencies or physical properties in the PDM (e.g., additives and water content may be varied for different strengths of sub-base or aggregate components). After mixing, the PDM empties from the pugmill onto a radial stacking conveyor. The "radial stacker" can be positioned to load directly into trucks, or to stockpile the material for re-handling to trucks, railcars, or back to hopper scows.

Following processing into one or more useful products, the PDM will transported via on-site conveyors to the designated temporary PDM stockpile/staging area. The PDM will be moved as required in this area using hydraulic excavators, bulldozers and vibratory compactors into large stockpiles for temporary storage in inventory until the material is sold for beneficial use as depicted in the flow chart included as Figure 5-1.

From the temporary stockpile area, the PDM will be trans-loaded by wheel loaders or hydraulic excavators into over road trucks for off-site shipment to ultimate destination sites. Based on direct loading, the PDM can be transported off-site at an anticipated rate of approximately 5,000 CY per day. Additional consideration will also be given to transporting the material off site using rail cars if available. Actual transport rate off site will be governed by locations receiving the material and their specific needs.

No flocculants or other additives are introduced to the raw dredged material to facilitate the dewatering process. The dewatering process is strictly physical in nature. The physical blending of the dredged material with the dry additives coupled with chemical hydration ensures that no free water is present in the processed dredged material after passing through the DMRF system.

5.2 Requirements for Use and Potential End Use Locations

To illustrate what types of material may or may not need processing and what types of admixtures might be used, AES has developed a dredged material recycling matrix (Appendix B). This matrix identifies potential beneficial use/upland disposal options based on both chemical and physical characteristics. The matrix also includes the expected ratios of admixtures that would be used (if necessary) to recycle the dredged material dependent upon these inherent characteristics of the dredged sediments and the proposed end uses.

The structural suitability of the recycled dredged material will be based on the requirements of the proposed beneficial use/upland disposal site. Some uses may require low permeability; others may require high strength. The matrix in Appendix B summarizes some of the general physical characteristic requirements and standards for the proposed end uses.

AES will make the determination on what to add to the dredged material during the processing operation. That determination will be made based upon the composition of the dredged sediments and the intended re-use application of the material. The matrix contained in Appendix B provides a listing of the various processes to be followed. It is important to note that the proposed dredged material recycling process does not “remove” contaminants from the dredged material. The process is a solidification/stabilization process which renders a normally high moisture/low strength material into a compactable fill material having optimal moisture content. However, the process will eliminate the leachability of contaminants that may be present in the raw dredged material. Once processed, the material will be stored until it is shipped to its end destination.

Testing of the PDM can be conducted prior to shipment to the proposed beneficial use/upland disposal site(s) if required by the end use. Both acceptance and, if necessary, testing criteria will be determined by the regulatory agency governing the proposed beneficial use/upland disposal rather than the process that is the subject of this application. The matrix in Appendix B provides a framework for use in determining what levels of contamination are acceptable for the various proposed end uses.

5.3 Disposition Alternatives

AES has explored multiple disposition/upland beneficial use options for the processed dredged material. Depending upon the ultimate Project schedule (for both the dredging project and each disposition/beneficial use site), some of these options may or may not be available during the actual dredging project timeframe. Conversely, additional sites that have not yet been identified are certain to become available. AES is continuing discussions with numerous options for upland disposition of the material from the proposed dredging project.

AES has developed a matrix providing a listing of various potential disposition methods. See Appendix B. The matrix itself is divided into categories of potential end uses dependent upon the chemical makeup of the processed dredged material. The matrix further identifies physical standards that may apply to each potential end use category. This matrix will be periodically updated as the Project moves through the permitting and development stage to identify new sites and end uses.

Commercial DMRFs in operation today have utilized multiple beneficial use sites for processed dredged material in addition to numerous landfill disposal options and several soil recycling facilities. To date, over 20 different projects have utilized in excess of 6 million CY of processed dredged material in five different states. These beneficial uses include mine reclamation, landfill capping and closure projects, Brownfield redevelopment sites, infrastructure improvement projects, and golf course construction to name just a few.

The following is a detailed listing of categories of upland disposition sites/projects used for processed dredged material from DMRFs in the New York/New Jersey Harbor:

5.3.1 Brownfield Redevelopment Sites

In New Jersey, numerous Brownfield sites have utilized processed dredged material for grading and capping as part of the preferred remedial action and redevelopment at these sites. Both contaminated (with appropriate processing) and uncontaminated dredged material has been utilized at these sites.

5.3.2 Landfill Capping & Closure

Several landfill capping and closure projects in New Jersey and New York have utilized processed dredged material as grading and capping material. Contaminated (with appropriate processing) dredged material has been utilized as grading material beneath a geomembrane and uncontaminated dredged material has been utilized as capping material above the liners. In some cases, the low permeability characteristics of the processed dredged material have allowed for use of the material in construction of the barrier layer itself.

5.3.3 Mine Reclamation

Following a successful demonstration project, the State of Pennsylvania has issued a General Permit authorizing the use of processed dredged material for strip mine reclamation. PADEP has authorized processed dredged material meeting the PADEP’s Regulated Fill Criteria for this use.

5.3.4 Landfill Daily Cover

Landfills require large volumes of select material for use as cover in daily operations. Processed dredged material has been utilized as daily cover at operating landfills in Pennsylvania, New York, and New Jersey.

5.3.5 Golf Course Construction

Some golf course construction projects have required large volumes of grading fill material. Processed dredged material has been utilized for that purpose at several projects in New Jersey.

5.3.6 General Construction Fill and Roadway Embankment

In addition to the categories presented above, aggregates produced from dredged materials have been sold into all of the above uses and as general construction fill.

5.3.7 Material Characterization

The majority of the proposed dredged material disposition/upland beneficial use sites already have regulatory requirements for characterization of inbound materials prior to acceptance. The characterization requirements are intended to ensure that the material is suitable for use at those sites. These requirements would be met and utilized as quality control ("QC") testing on processed material prior to shipment for disposition/upland beneficial use. In situations where no characterization requirements exist, AES may perform its own QC to ensure that the material meets the specifications agreed upon by the end user(s) or may require that the end user(s) perform appropriate testing. The selection as to which party would implement the QC practices in this latter situation would be decided on a case-by-case basis.

Dredged material processing with the addition of select additives, including Portland cement, creates a matrix that binds contaminants and significantly reduces or eliminates the potential for leaching of the contaminants to the environment. Use of cement for solidification/stabilization is recognized by the ACOE as a decontamination technology "because it enhances the immobilization of contaminants in the material. Contaminants generally become more tightly bound to the matrix, preventing significant levels from leaching into aquifers and water bodies or otherwise becoming biologically available. The high alkalinity found in commonly used binders (i.e., cement) further aids in reducing the leaching potential of toxic metals" (Source: Implementation Strategy of the Dredged Material Management Plan for the Port of New York and New Jersey, ACOE Draft September 1999).

The above has been demonstrated over recent years through leachate testing by the Multiple Extraction Procedure ("MEP"), which provides a conservative test of the potential for contaminants to leach from the engineered soil (a 7-step sequential leaching process). As a result, in the New York/New Jersey Harbor area, DMRFs, have processed over 6 million CY of dredged material for beneficial use at over 20 locations in New York, New Jersey and Pennsylvania within the past seven years. None of those locations have reported any problems with leachate formation.

By following the framework identified in the matrix, it is expected that all material will be suitable for reuse after processing; however, in the event that chemical testing that may be required prior to the end use application reveals the dredge material is unsuitable for beneficial use due to contaminant levels, AES or the third party seeking to use the PDM will properly characterize the dredge material and determine its disposition in accordance with the regulations of the State of Maryland (COMAR 26.13). Depending on the type and level of contamination, the sediment may be used as daily cover at a landfill, incinerated, or treated. The proper method of treating the waste material will be determined in consultation with appropriate agencies.

Local RCRA Treatment Storage and Disposal Facilities/Transfer Stations

Clean Harbors, Inc.

Baltimore Facility
1910 Russell Street
Baltimore, MD 21230
410.244.8200

The Veolia Environmental Services (VES) York, Pennsylvania

105 Willow Springs Circle
City: York
State: PA
ZIP: 17402
Phone: (717) 764-8677

For Non-Hazardous Dredged Material:

Mountain View Reclamation
9446 Letzburg Road
Greencastle, PA 17225
(800) 634-4595

Pine Grove Landfill
193 Schultz Road
Pine Grove, PA 17963
(800) 634-4595

Mountainview Landfill
13300 New Georges Creek Road SW
Frostburg, MD 21532
(301) 463-3373

For Oversize/Debris:

Pappy's Landfill
1020 Oak Avenue
Joppa, MD 21085
(410) 679-8075

5.4 Contingency Plan

Two potential end use facility owners have been identified by AES for contaminated sediments should they not be acceptable for beneficial reuse and recycling. The two end use facility owners have confirmed their ability to receive "environmentally approved" dredged material (in the case of Waste Management's five named facilities; reference letter dated November 1, 2007 from Tom Foley of Waste Management to Dan Morrow of Clean Earth, Inc.) and "clean" or "approved non-hazardous" dredged material (in the case of Allied Waste's named facilities; reference inter-office memorandum dated

September 6, 2007 from Tim Schotsch of Allied Waste to David Haskins, Allied Waste Landfill Sales Manager) from the Project in correspondence contained in Appendix A.

The phrase "environmentally approved" as used in the Waste Management letter refers to the internal review and acceptance procedures of the respective end use placement sites as well as their respective facility operating permit requirements.[8] These requirements include physical and chemical thresholds that the material must meet for approval for acceptance into the individual facility. These thresholds vary further within the respective end use facilities based on the selected use(s) or disposal method(s) chosen for the material (i.e., use as alternate daily cover, construction material, or for land disposal). Waste Management's review of the data for the Project indicates the material is acceptable at the listed facilities. However, a final determination will be made upon actual application for acceptance of the material at the facility, including the final shipment schedule, at the time of execution of the proposed dredging activities.

The phrase "clean and approved non-hazardous" as used in the Allied Waste memorandum has a similar definition as stated above. The correspondence that identifies the operating permit for the King and Queen Landfill[9] further clarifies that adequate capacity is available at the King and Queen facility to accommodate the majority if not all of the estimated dredge volume from the Project.

Documentation that the processed dredged material meets the definition of "clean and non-hazardous" is provided in the analytical data previously summarized in Section 2.3. None of the values listed for sediment sample analyses exceed thresholds that would render the sediment as hazardous. Further, sediment from this same location has been dredged as recently as December 2006 to January 2007 and placed at Hart-Miller Island as part of the overall plan to establish additional habitat for shore and migratory bird populations, a use incompatible with disposal of hazardous waste.

[8] Operating permit for the Amelia Landfill: VADEQ Permit No. 540. Operating permit for the Charles City Landfill: VADEQ Permit No. 531. Operating permit for the Middle Peninsula Landfill: VADEQ Permit No. 572. Operating permit for the Atlantic Waste Disposal, Inc. facility: VADEQ Permit No. 562. Operating permit for the King George Landfill: VADEQ Permit No. 586.

[9] Operating permit for the King and Queen Landfill: VADEQ Permit No. 554.

6. REGULATORY REQUIREMENTS

6.1 Permits and Applications Summary

As described in Section 1.3.3., as part of the project permitting process, AES has filed numerous permit applications for the LNG Terminal and Associated Pipeline, inclusive of the dredging operations and construction and operation of the DMRF. Additionally, AES has filed several federal, state and local permit applications as part of the Federal and State Project Permit Applications that are specifically for dredging operations and construction and operation of the DMRF.

AES has performed extensive evaluations of the potential impacts of the proposed project and presented the information in each of the permit applications described above as well as within the project control plans. Potential impacts form the proposed dredging project and associated control measures are described below in Section 6.2.

6.2 Control Measure Summary

6.2.1 Biota Impact

Information concerning short-term and long-term impacts on water quality and aquatic biota associated with the dredging proposed by AES, including substantiation that the dredging will improve conditions for water circulation and dissolved oxygen levels, is presented below.

6.2.1.1 Predicted Short-Term Impacts to Water Quality and Aquatic Biota

The potential short-term impacts to water quality from dredging activities typically involve the following:

- Turbidity; and
- Resuspension of contaminants sorbed to sediment particles.

The potential short-term impacts to aquatic biota typically include the following:

- Disturbance/removal of established sediment habitat;
- Disturbance/removal of established benthic macroinvertebrate communities;
- Disturbance/loss of aquatic vegetation;
- Disturbance/degradation of nearby habitat through transport and sedimentation of suspended particles; and
- Disruption of migration/foraging by fish.

As noted above, there is no SAV in the area proposed to be dredged by AES; thus, there will be no direct impacts to this resource due to disturbance/removal or disturbance/loss.

To minimize potential transport and sedimentation impacts to water quality and aquatic biota to the greatest extent feasible, AES has proposed to make use of techniques that will greatly reduce the release of suspended sediments into the water column within and adjacent to the construction site. Dredging will be conducted utilizing a mechanical (clamshell) dredge rather than by hydraulic means or with use of an environmental bucket.[10] A directional GPS will be used to locate the channel limits and to identify

[10] In general, the use of an environmental bucket (equipped with vents, gaskets, and covers) or equivalent would be used if necessary to minimize the re-suspension of sediments into the water column during dredging (and if

shoaled areas. Sediment will be removed to the design depth of 45 feet below MLLW. Computer-controlled recording software will track the progress of the dredging and will ensure complete coverage of the area to be dredged.

In general, environmental dredging techniques are employed where the level of chemical constituents present in the dredged material to be removed indicate a potential for unacceptable risk for adverse environmental or human health effects from the dredging process. For the dredging proposed by AES, both the recent extensive characterizations performed by AES, including elutriate testing, and background data indicate that the dredging will encounter both recently deposited (Holocene) sediments as well as underlying "native" sand materials that are not expected to negatively impact the environment or human health.[11]

Note that these techniques have not been used by dredge operations at this same location and nearby areas in past ACOE and Maryland permitted dredging; therefore, the proposed dredging will be taking control steps beyond those used with other projects here in the past.

Water quality impacts associated with suspended sediment are also possible if contaminants preferentially leach to the water column from exposed contaminated dredge material. Elutriate testing of sediment to be dredged was performed as described above. This testing has shown that minimal water quality impacts may be possible from only two heavy metal contaminants that were detected slightly above water quality standards. This indicates that very limited impacts may be possible in the short term; i.e., the time frame during dredging when sediment is actively disturbed and contaminated sediment may dynamically come in contact with the water column. One additional potential water quality impact was the detection of tributyltin in one sample (HA-123 shallow interval) where the exceedance was 1 part per billion. Because the tributyltin was not detected in the deep elutriate sample interval at this location (14-16 feet), the removal of the shallow sediments during dredging operations will improve bottom sediment conditions by eliminating the possibility of remobilization. Once dredging is complete in an area, suspended sediment resettles, re-equilibrates with sediment pore water, and the potential for release of contaminants that may remain to the pore water becomes limited. Thus, no other short and no long term water quality impacts would be anticipated.

Disturbance and degradation (through transport and sedimentation of suspended particles) of established benthic habitat and invertebrate communities is unavoidable in any dredging operation, whether intended for navigational or remedial purposes. The Maryland Department of the Environment (2004) has determined that "Navigation Channel" status is applicable to the dredged portions of the river extending from the mouth of the Patapsco River (confluence with Chesapeake Bay) to Curtis Bay and Creek, and the Middle and Northwest Branches. A "Navigation Channel" designation acknowledges the instability of the benthic community within outer and inner deep-dredged channel areas due to the

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contaminant residuals are present at unacceptable levels in the sediment, as determined by chemical analyses cited herein)

[11] It should also be pointed out that environmental dredging methods may be used only for the overlying sediment layer in areas where results of physical and/or chemical characterization of the sediments indicates the need for use of such methods. Thus, even if AES were to voluntarily introduce a new standard of dredge technology into the Port of Baltimore, it would be possible to use the technology only on the top layer of sediments due to the composition of the deeper sediments.

historic dredging activities associated with the Harbor. In such areas, opportunistic species generally comprise the benthic community. New disturbances in areas such as proposed to be dredged by AES, i.e., those designated as a "Navigation Channel" because they are unstable and periodically disturbed, will result in recolonization by the same type of opportunistic species as existed immediately prior to the disturbance. Where recolonization of disturbed areas occurs, it would take place within short timeframes. The techniques described above for minimization of suspended particles will ensure that even these expected short term impacts are reduced to the greatest extent feasible.

It is anticipated that there will be no negative sedimentation impacts in areas located more than 1,200 feet from the dredge activities, and impacts that may exist would diminish with distance from the dredge activities. Importantly, the Fort Carroll oyster restoration project that is located about 1,500 feet away from the closest area proposed to be dredged (west northwest from the approach channel) would not be impacted by the dredging proposed by AES. In this regard, consultation with NMFS is ongoing and AES has requested the concurrence of NMFS regarding the lack of anticipated impacts associated with the proposed dredging activity on the Fort Carroll oyster reef restoration project.

Finally, construction will be scheduled such that short-term impacts to fish known to migrate through these waterways should be minimal.

6.2.1.2 Predicted Long-Term Impacts to Water Quality and Aquatic Biota

There are two general categories of long-term impacts to water quality and aquatic biota to be considered for this project:

- Cumulative effects of short-term impacts caused by repeated maintenance dredging; and
- Impacts resulting from permanent changes affecting water movement and/or sediment and contaminant loadings.

The approach channel and turning basin associated with the LNG Terminal are estimated to require maintenance dredging approximately 500,000 CY of dredged material every six years. As a result of the mitigation of short-term impacts described above, there are no expected long-term cumulative impacts resulting from maintenance dredging. The lack of impacts associated with permanent changes affecting water movement and/or sediment and contaminant loadings are described below.

6.2.1.3 Water Circulation

Although channel deepening may create opportunity for vertical stratification, the connection of the approach channel and the turning basin is better expected to create an avenue for circulation of the deeper water within the vicinity of the LNG Terminal that does not currently exist (past bathymetry submitted to MDE associated with the AES dredge permit application clearly shows deeper bathymetric "pockets" within the Sparrows Point waterfront area and marine channel than the portion of the channel that connects to the Brewerton Angle main deep channel within the Patapsco River). The rationale for the expectation that the deepening will create an avenue for better circulation of the water is set forth below.

Circulation patterns in the Chesapeake Bay are typically characterized by the two-layer circulation model (see Li et al., 2005) where surface flows are "outflows" (i.e., away from Baltimore City toward and down the Chesapeake Bay), and near-bed flows are "inflows" (i.e., toward Baltimore City from the Chesapeake Bay), with no flow in the middle layer. The density stratification present in this flow pattern typically prevents circulation between the surface and near-bed layers. As early as 1960, Baltimore Harbor has been documented to sometimes demonstrate a unique 3-layer density-driven circulation pattern (see Chao et al., 1996). This pattern consists of "inflows" in the surface and near-bed layers, and an "outflow" in the middle layer. This flow pattern promotes mixing between the surface and near-bed layer. This pattern would be inhibited by the presence of bathymetric barriers that disconnect the deeper, near-bed inflow pattern, as are currently shown to be present in the Sparrows Point bathymetry. Therefore, it is concluded that deepening the approach channel to the depth of the turning basin will provide bathymetry better suited to a consistent (rather than interrupted) flow pattern. This would foster a similar 3-layer density-driven circulation pattern, which would reduce the likelihood of seasonal stratification in the deeper areas.

6.2.1.4 Dissolved Oxygen

Considerable water quality data have been collected within the Baltimore Harbor and Patapsco River. Existing conditions within Baltimore Harbor and Patapsco River have warranted a low Index of Biological Integrity ("IBI") rating. Very low dissolved oxygen ("DO") levels have been attributed to weak circulation patterns and the presence of pollutants from upland sources (e.g., phosphorous and nitrogen), and chemical contaminants within the upper surface layers of the sediments from a variety of potential sources, including wastewater discharges and nutrient loadings. Low DO levels are most pronounced during summer months and within deep water areas.

The dredging proposed by AES will temporarily disturb sediment-bound contaminants. As noted above, testing indicates that the re-suspension will not produce acute or chronic impacts in biotic species in the area. The re-suspension will, however, temporarily increase the mass of sediment-bound chemical contaminants in contact with surface water thereby temporarily reducing DO levels. These sediment-bound contaminants (e.g., phosphorus and nitrogen from upland sources and compounds such as PAHs detected in sampling performed for the proposed dredging project), that are documented in materials supplied by AES to MDE and in historical studies conducted in other parts of the Patapsco River and Baltimore Harbor), have a propensity to combine with oxygen, thus removing the oxygen from the water. *Any* removal of these oxygen-combining contaminants will produce a long-term positive impact on the levels of DO because those contaminants will not be present to combine with and consume the DO. Importantly, the depth to which AES has proposed to dredge is generally below the level at which contamination exists (the level of contamination decreases with depth in the sediment column). Thus, not only will large volumes of contaminated sediments be removed from the system, including their associated chemical oxygen demand, but sediment that is generally free of contaminants or is native sediment will be exposed. The native sediments do not contain the oxygen-demanding contaminants that currently exist in the surficial sediments. In other words, decreased DO levels will be temporary and limited in scope to the areas in the immediate vicinity of the dredge activity; the long-term benefit of removing contaminants so that they do not continue to attach to the oxygen outweigh these short term impacts.

The issues of water circulation and the levels of DO are also linked. As described in Resource Report 2, *Water Use and Quality*, shallower sediment areas currently exist between the outflow area of the Sparrows Point Marine Channel to the Patapsco River and Baltimore Harbor, which tend to prevent water circulation between the Sparrows Point waterfront and the deeper water located within Patapsco River. Water depth in the drydock area is approximately 40 to 45 feet deep, but is cut off from deeper areas of the Patapsco River and Chesapeake by the shallower shipping cannel that has an approximate depth of 25 to 30 feet. The proposed dredging will deepen the channel. This provides the physical setting, not currently present, to allow increased flow and circulation between the two waterbodies, thereby potentially improving DO levels.

6.2.1.5 Expected Project Compliance with Use 1 DO Requirements and Turbidity Limits

DO concentrations are currently being monitored at a site located on the Patapsco River at the Fort McHenry wetland restoration site in Baltimore, Maryland. Continuous monitoring data are being collected and managed at this site by the Maryland Department of Natural Resources. DO and turbidity data available for August 1 through August 7, 2007 were reviewed (Maryland Department of Natural Resources, 2007). In general, the DO values varied widely throughout a 24-hour period with lower DO levels (less than 3.4 mg/l) observed for the late evening and early morning hours (9:00 PM to 7:00 AM). The average for the remainder of the day (7:15 AM to 8:45 PM) was 7.32 mg/l. The cumulative DO average for the entire dataset was 5.65 mg/l. Turbidity data values were generally higher during the afternoon and evening hours (12 PM – 10 PM). The turbidity average for this time frame is 9.75 NTUs and 6.41 NTUs for the rest of the day. The cumulative turbidity average for the entire data set was 7.84 NTUs. These values are summarized in the table below.

Average Dissolved Oxygen and Turbidity Levels for the Patapsco River – Baltimore Harbor, Maryland Monitoring Station. August 1 2007 through August 8, 2007

Average Dissolved Oxygen (mg/l)			**Average Turbidity (NTUs)**		
9 PM–7 AM	7:15 AM–8:45 PM	Cumulative Average[1]	12 PM–10 PM	12:15 PM–9:45 PM	Cumulative Average[1]
3.38	7.32	5.65	9.75	6.41	7.84

[1] Cumulative average for the time frame of 7:45 AM August 1, 2007 through 7:45 AM August 8, 2007
Source: Maryland Department of Natural Resources, 2007.

Historic DO data (1992–1997) show that anoxic conditions (at or near 0 mg/l) have existed in the past within bottom layers of the mouth, inner harbor, and channel of Baltimore Harbor during the summer months (Maryland Department of the Environment, 2004). Data entered into modeling scenarios projected that non-attainment of DO requirements occur 77 percent of the time for the period of June 1 through September 30 within the deep channel areas of the Patapsco River mesohaline region, primarily because of hydrological modifications authorized by the Federal Rivers and Harbors Act and a complex tidal circulation that results in the transfer of hypoxic and anoxic waters from the main channels of the bay into the Patapsco River. The Use Attainability Analysis determined that a “Navigation Channel” status be designated for the dredged portions of the river extending from the mouth of the Patapsco River (confluence with Chesapeake Bay) to Curtis Bay and Creek, and the Middle and Northwest Branches. As a result of these actions, the DO requirement for these areas was set at 0 mg/l for the period of June 1 through September 30.

The Patapsco River and Baltimore Harbor are designated as Use 1 waterbodies. Current state water quality standards for Use 1 waters are set at a minimum of 5 mg/l for dissolved oxygen and a maximum of 150 NTUs for turbidity (COMAR 26.08.02.03-3). Through implementation of the proposed dredging techniques and anticipated construction timelines discussed previously, it is expected that the Project-related activities will be in compliance with these water quality standards.

In summary, the proposed dredging has been planned using sampling data to demonstrate that water quality impacts, to the extent they may occur, will be minimal in the short term associated with the dredging and are not anticipated long term (removal of contaminated sediment from the system is anticipated to improve baseline conditions affecting water quality). Disturbance of benthic habitats within the dredged area will occur; however, as documented through biologic survey of the area, there is no SAV present that would be affected and the habitat present is primarily soft sediment affected by past and current permitted maintenance dredging. The area is colonized by opportunistic species which are expected to recolonize quickly following dredging. The dredging will create bathymetry that will be better suited to a consistent (rather than interrupted) flow pattern. This pattern, and removal of contaminated sediment (which generates chemical oxygen demand), will improve conditions for deep water DO levels to be maintained at or above the designated criteria for the Patapsco.

6.2.2 Potential Air Quality Impacts of Proposed Project

Construction emissions and impacts will be restricted to the construction period, approximately three years in total, and will terminate once construction has been completed. Based on this analysis, direct emissions from combustion equipment, indirect emissions from commuting construction workers and from haul trucks, and fugitive dust emissions are not expected to significantly impact ambient air quality in the Project Area.

6.2.2.1 Construction Emissions

The LNG Terminal construction includes widening and deepening the existing approach channel and turning basin at Sparrows Point to accommodate the LNG ships. Dredging related construction activities include both onshore and offshore equipment and processing. Onshore activities include start-up and dredged material transfer and processing operations, involving typical construction equipment, such as cranes, backhoes, excavators, loaders, trucks and sweepers. Internal combustion engines used to power this equipment will result in temporary emissions of NO_X, SO_2, CO, PM_{10} and VOC. A dredged material recycling facility (DMRF), as described in Section 1.5.1.2.A of Resource Report 1, *General Project Description*, will also be constructed and operated at the construction site, involving use of hoppers, conveyors, pug mills for mixing additives, and stacking equipment. Pug mills and the additive delivery system will be equipped with separate baghouse dust collectors to control PM_{10} and $PM_{2.5}$ emissions. Marine vessels and equipment used for offshore dredging activities will include a clamshell dredge or suitable alternative required by permit, in addition to tug boats, survey/work boats, crew boats and inspecting/diving vessels. Diesel engines used to power these vessels and the dredge will result in temporary emissions of NO_X, SO_2, CO, PM_{10} and VOC. Indirect emissions will also result from transfer of the PDM offsite with dump trucks and from workers commuting to the Terminal Site. The duration of the dredging activities at the LNG Terminal has been estimated at about two years.

AES will use the mitigation measures identified in Section 6.3.2 and the Fugitive Dust Suppression and Monitoring Plan (included as Appendix 9D to Resource Report 9, *Air and Noise Quality*), to minimize the fugitive dust emissions associated with transfer of the PDM once it has been processed in the DMRF. These measures may include the application of water or dust suppressants, covering of haul trucks, use of paved roads to the extent possible, limiting vehicle speed and stabilizing disturbed areas.

AES has estimated the actual emissions of criteria air pollutants associated with dredging related activities at the LNG Terminal based on the assumptions and calculations provided in Appendix 9A of Resource Report 9, *Air and Noise Quality*. The calculations have already been made part of the overall project emissions characterization included in AES filings for the project and the DEIS responses that are being provided by AES to the involved agencies. The calculations are being used to plan for air emissions mitigation to be performed and offsets that will be required for the overall project. A summary of these calculations related to dredge operations and emissions from PDM transport are presented in Appendix E. AES's assumptions concerning the types, numbers and operating schedules for the various construction equipment, marine vessels and activities are based on information provided by construction contractors being considered for the Project.

Indirect emissions were also estimated from motor vehicles associated with workers commuting to and from the LNG Terminal construction site associated with dredging activities and from haul trucks and additive supply trucks. Emissions were conservatively estimated based on the assumptions and calculations presented in Appendix 9A of Resource Report 9, *Air and Noise Quality*. A total of 15 workers were assumed to commute to the LNG Terminal construction site by light duty gasoline vehicles each day for a total of 24 months. A total of 218 haul trucks and 27 additive supply trucks per day were assumed for 276 days per year during the two-year dredging duration. Emission factors were obtained from EPA AP-42, Appendix J (1998) for light duty gasoline vehicles and trucks and heavy duty diesel haul and supply trucks.

AES estimated the emissions from construction equipment, marine vessels, and material processing and indirect emissions from PDM hauling and commuting construction workers associated with dredging activities. Emissions are summarized in total tons during the construction period. The estimated actual emissions of NO_2 and CO from the use of diesel CI engines in dredging related equipment over the construction period are 268 and 83 tons, respectively. As is typical of emissions from diesel engines, actual emissions rates for other pollutants (SO_2, PM_{10} and VOC) are significantly lower than NO_2 and CO emissions. The calculations have already been made part of the overall project emissions characterization included in AES filings for the project and the DEIS responses that are being provided by AES to the involved agencies. The calculations are being used to plan for air emissions mitigation to be performed and offsets that will be required for the overall project. A summary of these calculations related to dredge operations and emissions from PDM transport are presented in Appendix E.

To assess qualitatively the potential for odors and inhalation of dredged sediments due to dredging and processing of the sediments, AES obtained information from Clean Earth Dredging Technologies Inc. (“CEDTI”), with whom AES is considering contracting for the dredging work associated with the LNG Terminal. In CEDTI’s experience, the dredged material may appear (visually) to have a high organic content. However, typical Total Organic Carbon results are around three to five percent. Further, the odor of raw dredged material is minimal and not pervasive. At the dredging site, the processing site and the storage/end use sites there will be very little odor. The potential for ammonia odors exists at the DMRF due to the addition of alkaline materials into the dredged sediments, but this odor will dissipate rapidly and only be noticeable within feet of the processed material. For example, CEDTI operates its Jersey City, New Jersey processing facility within 1,000 feet of high-end condominiums near Manhattan and has never received a complaint or even a comment from neighbors or local regulators. Likewise, no complaints have been made at any of CEDTI’s end use sites. CEDTI does not employ any odor suppression techniques at any of its current facilities. Furthermore, CEDTI indicates that it is not aware of any quantitative information available to estimate ammonia emissions from operation of the DMRF. Therefore, the potential for ammonia emissions from the proposed DMRF could not be evaluated quantitatively.

The majority of materials handled in the DMRF will be high moisture-content dredged materials with little potential for dust emissions. Dry additive filling, storage and transfer equipment will be contained in enclosed structures with baghouse dust collectors for high-efficiency dust control. As a result, $PM_{2.5}/PM_{10}$ emissions from the DMRF will be negligible, with uncontrolled emissions currently estimated at less than 1 TPY. Based on estimated uncontrolled $PM_{2.5}/PM_{10}$ emissions, an Air Quality Permit to Construct will not be required prior to construction of the DMRF additive material storage, transfer, mixing and dust control equipment.

Based on this analysis, direct emissions from dredging activities, indirect emissions from haul trucks and commuting construction workers, and fugitive dust emissions, are not expected to significantly affect ambient air quality in the Project Area. These emissions and impacts will be restricted to the construction period, approximately 36 months, for the LNG Terminal and will terminate once construction has been completed.

6.2.2.2 Construction Air Quality Impacts Mitigation

The construction of the Project will result in minor, short-term impacts to local ambient air quality. A summary of the actions that may be used to minimize these impacts is as follows:

- Require contractors to meet all federal, state and local air quality regulations and emission standards applicable to their equipment;
- Apply water or dust suppressants to disturbed areas, as necessary, to reduce vehicle traffic dust;
- Cover open hauling trucks with tarps, as necessary;
- Use paved roads for construction vehicle traffic, wherever practical;
- Limit vehicle speeds as required to reduce dust generation;
- Respond promptly to any significant particulate emission concerns that occur during construction by evaluating the source of emissions and ensuring all practicable mitigation measures are being implemented; and
- Upon completion of construction activity, stabilize disturbed areas.

In addition, mitigation measures required to comply with general conformity will be implemented. These measures include a demonstration of consistency with applicable control measures and regulations that are relied upon in the SIP, a demonstration that direct and indirect emissions have been identified and accounted for in the SIP attainment demonstration or the emissions must be offset through a SIP revision or other enforceable measure so that there is no net increase in emissions.

6.2.3 Sediment Quality Impacts

As described in Section 2.3 the data sediment data illustrates that the highest concentrations of chemical constituents, primarily semi-volatile PAHs and heavy metals, are found in the shallow, fine-grained sediments with high organic carbon content that accumulate in low-energy depositional areas that tend to be close to the shore. Constituent concentrations generally decrease with depth at all locations, and decrease with distance from shore. The depth range of sediments with elevated constituent concentrations also appears to decrease further away from the shore, consistent with net import and deposition of fine-grained sediments close to the shore, rather than net scour and export of these sediments.

Overall, the analytical data is consistent with the prior data collected and analyzed for the dredging proposed by AES. The results indicate that the removal of the shallow and some of the intermediate sediment during dredging operations should improve bottom sediment conditions in the areas where dredging is planned.

Dredging will be conducted utilizing a mechanical (clamshell) dredge. A directional GPS will be used to locate the channel limits and to identify shoaled areas. Sediment will be removed to the design depth of 45 feet below MLLW. Computer-controlled recording software will track the progress of the dredging and will ensure complete coverage of the area to be dredged.

6.2.4 Traffic Impacts

AES performed a traffic impact analysis to determine the level of service (LOS) of the I-695 Exit 43 on-ramps and off-ramps in vicinity of the proposed AES Sparrows Point LNG Terminal and DMRF. Level of Service is a qualitative measure of the operating conditions of an intersection or other transportation facility. There are six LOS (A through F) defined; LOS A represents the best operating conditions with no congestion, and LOS F is the worst with heavy congestion. Roadways and intersections with LOS E or F would have traffic conditions at or above capacity. Traffic patterns would be congested, unstable, and normally unacceptable to individuals attempting to access and use roadways and intersections with LOS E or F (see definitions below).

Description of traffic level of service (LOS)

Level of Service	Description
A	*(Free flow conditions)* Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream with a high level of physical and psychological comfort. The effects of minor accidents or breakdowns are easily absorbed at this level.
B	*(Reasonably free flow conditions)* The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and breakdowns are still easily absorbed.
C	*(Stable operations)* Traffic flows are approaching the range in which small increases in traffic will cause substantial deterioration in service. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require additional care and vigilance. Minor accidents may still be absorbed, but the local deterioration in service will be substantial with delay forming behind any blockage. The driver now experiences a noticeable tension due to the additional vigilance required for safe operation.
D	*(High density, but stable flow. Bordering unstable flow)* Small increases in traffic could cause substantial deterioration in service. Freedom to maneuver within the traffic stream is severely limited, and the driver experiences drastically reduced physical and psychological comfort levels. Even minor accidents can be expected to create substantial delays because the traffic stream has little space to absorb disruptions.
E	*(Very unstable operations)* Virtually no usable gaps exist within the traffic stream. This means that any disruption, such as a vehicle entering from a ramp or changing lanes, causes following vehicles to slow or stop to admit the vehicle disrupting the flow. Any incident can be expected to produce substantial delay. Maneuverability within the traffic stream is extremely limited, and the level of physical and psychological comfort is extremely poor.

F	*(Forced or breakdown flow)* Such conditions generally exist for a number of reasons such as traffic accidents, recurring points of congestion, or peak hour conditions that exceed the current design of the facility. LOS F is used to identify that point where the facility has reached maximum capacity and a complete breakdown of service occurs.

Five scenarios were evaluated to determine the suitability of the existing road network to support the traffic associated with the project. These included:

- **Existing** – Traffic volumes and turning movements were provided by the Maryland Transportation Authority (MDTA) and used to determine the LOS for 2005.
- **Construction**– Construction worker vehicles and trucks were added to the existing traffic during peak periods, and LOS estimations were determined for I695 access points. It was estimated that the construction phase of the proposed LNG terminal, DMRF, and the proposed power plant (if constructed) would introduce 430 single occupancy vehicles, 8 busses, and 245 dredge trucks per day coming to and from the site. Construction workers were assumed to use primarily single occupancy vehicles ("SOV") and busses during their commutes; of which, 50% would occur during peak AM and PM traffic periods. This would be consistent with some construction workers arriving early, staying late, and working odd shifts such as 6am until 3pm. Employees were assumed to travel through the roadway element being analyzed in proportion to the vehicle volumes on I695 during that period. It was assumed that one eighth of the trucks would operate during peak periods. For a worst-case analysis, it was assumed that every truck traveled through each-and-every roadway element analyzed.
- **No-Build** – 2010 traffic conditions without the proposed facility or construction traffic. A 2% annual growth factor was applied to the 2005 volumes and LOS estimations were made for the year 2010 volumes under the no-build scenario.
- **Operations With Trucks**– 2010 traffic conditions with the addition of LNG terminal and power plant employee traffic and the continued operation of dredge material haul trucks. Again, it was assumed that one eighth of the trucks would operate during peak periods. For a worst-case analysis, it was assumed that every truck traveled through each-and-every roadway element analyzed. The proposed facilities (proposed LNG terminal, DMRF, and the proposed power plant) would employ 75 employees. Employees were assumed to use SOV during their commutes; of which, 70% would occur during peak AM and PM traffic periods. For a worst-case analysis, all employees were assumed to travel through the roadway element being analyzed.
- **Operations Without Trucks (Build)** – 2010 traffic conditions with the addition of LNG terminal and power plant employee traffic only. The proposed facilities (LNG terminal and power plant) would employ less than 75 employees.

LOS during both AM and PM peak traffic periods was determined for the on-ramps and off-ramps for the I-695 Exit 43 interchange, including the stop controlled intersection at the bottom of the eastbound/northbound off-ramp. The LOS is expected to be C or better for all cases examined at all locations. For the majority of conditions examined, including all on-ramps and off ramps to I695, the LOS is expected to be A or B. This is consistent with reasonably free flow unimpeded traffic conditions. In addition, for all locations there would be no change in LOS with build scenario when compared to the no-build scenario. These roadway elements have ample capacity to support the limited vehicles from the proposed project in addition to traffic growth expected without the facility. No changes in roadway configurations, intersections, or signalization would be required.

Level of Service – Interstate 695, Exit 43
Baltimore County, MD

Intersection	Existing	Constructio n	No-Build	Operations With Trucks	Operations Without Trucks (Build)
AM Peak Period					
Westbound/Southbound – Off-ramp	A	B	A	B	A
Westbound/Southbound – On-ramp	B	B	B	B	B
Eastbound/Northbound – Off-ramp	A	A	A	A	A
Eastbound/Northbound – On-ramp	A	A	A	A	A
Eastbound/Northbound –Stop-controlled intersection at bottom of off-ramp	B	B	B	B	B
PM Peak Period					
Westbound/Southbound – Off-ramp	A	A	A	A	A
Westbound/Southbound – On-ramp	A	B	B	B	B
Eastbound/Northbound – Off-ramp	B	B	B	B	B
Eastbound/Northbound – On-ramp	B	C	B	B	B
Eastbound/Northbound – Stop-controlled intersection at bottom of off-ramp	C	C	C	C	C

7. PLAN SUMMARY AND CONCLUSIONS

Construction of the LNG Terminal will include widening and deepening the existing approach channel leading off of the Brewerton Channel and creating a turning basin immediately offshore of the Terminal Site to accommodate the ships expected at the LNG Terminal.

Dredging is anticipated to begin in the berthing area immediately adjacent to the Terminal Site, and progress in reaches towards the Brewerton Channel to allow for earlier commencement of pier/dock construction operations. Assuming a dredged channel and turning basin depth of 45 feet, it is estimated that approximately 3.7 million CY of dredged material may be generated, a portion of which will be used for recycling. Maintenance dredging under current permits may decrease this amount somewhat, depending on the amount performed prior to LNG Terminal construction.

As described in Section 6.2 the Project will not significantly impact marine biota in the vicinity of the dredge area, implementation of the process controls at the DMRF and utilization of specific dredge technology will reduce the potential for fugitive dust emissions and significant increasers in turbidity, respectively, during the dredge operations. Once dredging is complete the sediment quality in the dredge area will be improved compared to existing conditions. The sediment that is removed will be processed through the DMRF and will be tested, as required by the end user, to ensure it is acceptable for beneficial reuse at an off-site location. For those materials that are not suitable for beneficial use, AES has established contingency plans that would allow for disposal at an appropriate upland location, which may include a hazardous waste landfill.

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AES Consolidated Dredge Plan
Table 1-1
Summary of Dredging Permits in Baltimore County Issued by or Currently Pending before the U.S. Army Corps of Engineers
AES Sparrows Point Project

Project Name	General Site Location	Public Notice Date	Approval Date	Application Number	Volume of Dredging (cu. yards)	Disposal Location
Baltimore Harbor and Channels, Maryland - Proposed Maintenance Dredging of the Craighill Entrance, Craighill Channel, Cutoff Angle Brewerton Channel, Ft. McHenery Channel, Brewerton Channel Eastern Extension, and Swan Point Channel	Craighill Entrance, Craighill Channel, Cutoff Angle Brewerton Channel, Ft. McHenery Channel, Brewerton Channel Eastern Extension, and Swan Point Channel	March 31, 2006	--	--	2,500,000	Hart-Miller Island Containment Facility and Poplar Island Environmental Restoration project
Rukert Terminals Corporation Berth "B"/Bulkhead & Dredging	Patapsco River, Northwest Harbor, Baltimore City, Maryland	December 12, 2005 to January 12, 2006	--	--	427,000	Hart-Miller Island disposal site
Harbor Point/Building Piers, Boat Piers Bulkhead & Dredging	In the Inner Harbor of the Northwest Branch of Patapsco River, Baltimore City, Maryland	July 6, 2005 to August 5, 2005	--	--	116,000	Hart-Miller Island disposal site
Rukert Terminals Corporation/Dredging	Patapsco River, Baltimore City, Maryland	June 2, 2005 to June 22, 2005	--	--	150,000	Hart-Miller Island disposal site
BWI - Sparrows Point, LLC	Patapsco River, Baltimore City, Maryland	February 18, 2005 to March 19, 2005	May 6, 2005	200464865	600,000 2,600,000	Hart-Miller Island disposal site, Approved disposal site to be determined
MD MPA/Harbor Wide/Dredging	Patapsco River and Chesapeake Bay, Baltimore City, and Baltimore County, Maryland	January 4, 2005 to February 4, 2005	March 9, 2005	200460754	6,485,000	Hart-Miller Island and/or Cox Creek disposal facility (over 10 years)
CNX Marine Terminals Inc./Dredging	Patapsco River, Baltimore City, Maryland	June 11, 2004 to July 11, 2004	December 12, 2005	200460762	1,800,000	approved disposal site
Kinder Morgan Chesapeake Bulk/Dredging	Patapsco River, Baltimore City, Maryland	May 27, 2004 to June 27, 2004	July 26, 2004	200460834	375,000	Hart-Miller Island disposal site
The General Ship Repair Corporation/Dredging	Patapsco River, Baltimore City, Maryland	May 3, 2004 to May 24, 2004	July 13, 2004	20060755	25,000	Hart-Miller Island disposal site

Note: Information obtained from: http://www.nab.usace.army.mil/Regulatory/Permit/tracking.htm

TABLE 2-1
SUMMARY OF DREDGE AREAS AND SEDIMENT SAMPLES
AES SPARROWS POINT LNG
AES CONSOLIDATED DREDGE PLAN

DREDGE AREA	APPROX. DREDGE AREA (ac.)	APPROX. DREDGE VOLUME (cy)	CORRESPONDING SEDIMENT SAMPLING EVENT	NO. OF LOCATIONS	NO. OF SAMPLES	SAMPLE SOURCE	ACREAGE/ SAMPLE	CUBIC YARDS/ SAMPLE
APPROVED PHASE I	94	600,000	2004 GZA	24 vibracores	3	composed from 9 locations		
APPROVED PHASE II	101	2,600,000						
06 MAY 2005 ACOE PERMIT	195	3,200,000					**65**	**1,066,667**
PROPOSED AES LNG	117	3,700,000						
JUNE 2006 SAMPLING EVENT			*2006 AES*	*15 vibracores*	*16*	*discrete*	*7*	*231,250*
AUGUST 2007 SAMPLING EVENT			*2007 AES*	*12 vibracores*	*28*	*discrete*	*4*	*132,143*
TOTAL				***27 vibracores***	***44***	***discrete***	***3***	***84,091***
PRIOR TO PHASE I DREDGE	94	600,000	2006 MPA	12 shallow	4	composed from 12 locations	24	150,000
PROPOSED AES LNG CONSIDERING GZA DATA	117	3,700,000	2004 GZA 2006 AES 2007 AES	52 vibracores	47	44 discrete 3 composite	2	78,723
PROPOSED AES LNG CONSIDERING GZA & MPA DATA	117	3,700,000	2004 GZA 2006 MPA 2006 AES 2007 AES	52 vibracores 12 shallow	51	44 discrete 7 composite	2	72,549

Attachment D43

TABLE 2-2 (Revised 23 May 2008)
SEDIMENT RESULTS AND COMPARISON TO SEDIMENT GUIDELINES
AES SPARROWS POINT, BALTIMORE, MD
PAGE 1 OF 3

		Sample ID/Depth																															Marine Sediment Guidelines[1]					
		HA-116	HA-116	HA-117	HA-117	HA-118	HA-118	HA-118	HA-119	HA-119	HA-119	HA-120	HA-120	HA-120	HA-121	HA-121	HA-121	HA-122	HA-122	HA-123	HA-123	HA-124	HA-124	HA-125	HA-125	HA-126	HA-126	HA-127	HA-127									
From MSL (ft)																																						
From ToS (ft)		0.0-2.0	10.0-12.0	0.0-2.0	8.0-10.0	0.0-2.0	10.0-12.0	22.0-24.0	0.0-2.0	6.0-8.0	14.0-16.0	0.0-2.0	8.0-10.0	15.0-17.0	0.0-2.0	14.0-16.0	26.0-27.0	0.0-2.0	8.0-10.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0	0.0-2.0	10.0-12.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0									Lowest Guideline[2]
Chemical	TEF	Shall	Deep	Shall	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Min	Max	Sample with Max Concentration	TEL	ERL	ERM	PEL	AET	
Volatile Organics (ug/kg)																																						
1,1,1-Trichloroethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,1,2,2-Tetrachloroethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,1,2-Trichloroethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,1,2-Trichlorotrifluoroethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,1-Dichloroethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,1-Dichloroethene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,2,4-Trichlorobenzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A					4.8	4.8
1,2-Dibromo-3-chloropropane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,2-Dibromoethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,2-Dichlorobenzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A					13	13
1,2-Dichloroethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,2-Dichloropropane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,3-Dichlorobenzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
1,4-Dichlorobenzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A					110	110
2-Butanone (MEK)		<150	<86	<110	<58	<220	<99	<88	<100	<110	<64	<110	<110	<94	<150	<91	<97	<61	<59	<120	<57	<63	<54	<56	<74	<52	<61	<65	<55	0	0	N/A						
2-Hexanone (MBK)		<31	<17	<22	<12	<45	<20	<18	<21	<22	<13	<23	<22	<19	<31	<18	<19	<12	<12	<25	<11	<13	<11	<11	<15	<10	<12	<13	<11	0	0	N/A						
4-Methyl-2-pentanone (MIBK)		<31	<17	<22	<12	<45	<20	<18	<21	<22	<13	<23	<22	<19	<31	<18	<19	<12	<12	<25	<11	<13	<11	<11	<15	<10	<12	<13	<11	0	0	N/A						
Acetone		<150	<100	<170	<58	<1600	<99	<110	<100	<110	<71	<230	<110	<130	<370	<120	<150	<110	<130	<410	<150	<320	<140	<320	<120	<180	<190	<310	<230	0	0	N/A						
Benzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Bromodichloromethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Bromoform		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Bromomethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Carbon disulfide		<31	<17	<22	<12	<45	<20	<18	<21	<22	<13	<23	<22	<19	<31	<18	<19	<12	<12	<25	<11	<13	<11	<11	<15	<10	<12	<13	<11	0	0	N/A						
Carbon tetrachloride		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Chlorobenzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Chloroethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Chloroform		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Chloromethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
cis-1,2-Dichloroethene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
cis-1,3-Dichloropropene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Cyclohexane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Dibromochloromethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Dichlorodifluoromethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Diisopropyl ether (DIPE)		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Ethyl t-butyl ether (ETBE)		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Ethylbenzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A					4	4
Isopropylbenzene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
m&p-Xylene		<31	<17	<22	<12	<45	<20	<18	<21	<22	<13	<23	<22	<19	<31	<18	<19	<12	<12	<25	<11	<13	<11	<11	<15	<10	<12	<13	<11	0	0	N/A					4	4
Methyl acetate		<77	<43	<54	<29	<110	<50	<44	<52	<55	<32	<57	<56	<47	<77	<46	<49	<30	<29	<62	<29	<32	<27	<28	<37	<26	<30	<33	<27	0	0	N/A						
Methyl t-butyl ether (MTBE)		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Methylcyclohexane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Methylene chloride		<170	<120	<97	<75	<250	<120	<110	<100	<150	<77	<110	<130	<130	<170	<100	<140	<79	<83	<140	<80	<160	<82	<85	<82	<63	<79	<140	<140	0	0	N/A						
o-Xylene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A					4	4
Styrene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
tert-Amyl alcohol (TAA)		<77	<43	<54	<29	<110	<50	<44	<52	<55	<32	<57	<56	<47	<77	<46	<49	<30	<29	<62	<29	<32	<27	<28	<37	<26	<30	<33	<27	0	0	N/A						
tert-Amyl ethyl ether (TAEE)		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
tert-Amyl methyl ether (TAME)		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
tert-Butanol (TBA)		<77	<43	<54	<29	<110	<50	<44	<52	<55	<32	<57	<56	<47	<77	<46	<49	<30	<29	<62	<29	<32	<27	<28	<37	<26	<30	<33	<27	0	0	N/A						
Tetrachloroethene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A					57	57
Toluene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
trans-1,2-Dichloroethene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
trans-1,3-Dichloropropene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Trichloroethene		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A					41	41
Trichlorofluoromethane		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Vinyl chloride		<15	<9	<11	<6	<22	<10	<9	<10	<11	<6	<11	<11	<9	<15	<9	<10	<6	<6	<12	<6	<6	<5	<6	<7	<5	<6	<7	<5	0	0	N/A						
Semivolatile Organics (ug/kg)																																						
1,1-Biphenyl		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
2,4,5-Trichlorophenol		<810	<490	<530	<310	<1000	<540	<500	<530	<530	<350	<660	<580	<550	<800	<570	<540	<400	<410	<1100	<420	<470	<370	<420	<400	<380	<400	<440	<400	0	0	N/A					3	3
2,4,6-Trichlorophenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					6	6
2,4-Dichlorophenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					5	5
2,4-Dimethylphenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					18	18
2,4-Dinitrophenol		<810	<490	<530	<310	<1000	<540	<500	<530	<530	<350	<660	<580	<550	<800	<570	<540	<400	<410	<1100	<420	<470	<370	<420	<400	<380	<400	<440	<400	0	0	N/A						
2,4-Dinitrotoluene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
2,6-Dinitrotoluene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
2-Chloronaphthalene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
2-Chlorophenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					8	8
2-Methylnaphthalene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A	20.21	70	670	201.28	64	20.21
2-Methylphenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					8	8
2-Nitroaniline		<810	<490	<530	<310	<1000	<540	<500	<530	<530	<350	<660	<580	<550	<800	<570	<540	<400	<410	<1100	<420	<470	<370	<420	<400	<380	<400	<440	<400	0	0	N/A						
2-Nitrophenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
3,3-Dichlorobenzidine		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
3-Nitroaniline		<810	<490	<530	<310	<1000	<540	<500	<530	<530	<350	<660	<580	<550	<800	<570	<540	<400	<410	<1100	<420	<470	<370	<420	<400	<380	<400	<440	<400	0	0	N/A						
4,6-Dinitro-2-methylphenol		<750	<450	<490	<290	<930	<500	<460	<480	<490	<320	<610	<530	<500	<730	<520	<490	<360	<380	<1000	<390	<430	<340	<390	<370	<350	<360	<410	<370	0	0	N/A						
4-Bromophenyl phenyl ether		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
4-Chloro-3-methylphenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
4-Chloroaniline		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
4-Chlorophenyl phenyl ether		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
4-Methylphenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					100	100
4-Nitroaniline		<810	<490	<530	<310	<1000	<540	<500	<530	<530	<350	<660	<580	<550	<800	<570	<540	<400	<410	<1100	<420	<470	<370	<420	<400	<380	<400	<440	<400	0	0	N/A						
4-Nitrophenol		<810	<490	<530	<310	<1000	<540	<500	<530	<530	<350	<660	<580	<550	<800	<570	<540	<400	<410	<1100	<420	<470	<370	<420	<400	<380	<400	<440	<400	0	0	N/A						
Acenaphthene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A	6.71	16	500	88.9	130	6.71
Acenaphthylene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A	5.87	44	640	127.87	71	5.87
Acetophenone		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Anthracene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	380	<230	<220	330	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A	46.85	85.3	1100	245	280	46.85
Atrazine		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Benzo[a]anthracene		<320	<200	<210	<120	1,300	<220	<200	<210	<210	<140	1,400	<230	<220	600	<230	<210	<160	<160	500	<170	<190	<150	<170	<160	<150	<160	<180	<160	500	1,400	HA-120 0-2'	74.83	261	1600	692.53	960	74.83
Benzo[a]pyrene		<320	<200	<210	<120	1,200	<220	<200	<210	<210	<140	1,900	<230	<220	1,100	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	1,100	1,900	HA-120 0-2'	88.81	430	1600	763.22	1100	88.81
Benzo[b]fluoranthene		<320	<200	<210	<120	1,500	<220	<200	<210	<210	<140	2,300	<230	<220	1,200	<230	<210	<160	<160	760	<170	<190	<150	<170	<160	<150	<160	<180	<160	760	2,300	HA-120 0-2'					1800	1800
Benzo[g,h,i]perylene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	1,300	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	1,300	1,300	HA-120 0-2'					670	670
Benzo[k]fluoranthene		<320	<200	<210	<120	770	<220	<200	<210	<210	<140	900	<230	<220	650	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	650	900	HA-120 0-2'					1800	1800
Bis (2-chloroethoxy) methane		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Bis (2-chloroethyl) ether		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Bis (2-chloroisopropyl) ether		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Bis (2-ethylhexyl) phthalate		<320	<200	270	<120	3,200	<220	<200	<210	<210	<140	1,900	<230	<220	470	<230	<210	<160	<160	6,000	<170	<190	<150	<170	<160	<150	<160	<180	<160	270	6,000	HA-123 0-2'	182.16			2646.51	1300	182.16
Butyl benzyl phthalate		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					63	63
Caprolactam		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Carbazole		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Chrysene		<320	<200	<210	<120	1,200	<220	<200	<210	<210	<140	1,700	<230	<220	660	<230	<210	<160	<160	520	<170	<190	<150	<170	<160	<150	<160	<180	<160	520	1,700	HA-120 0-2'	107.77	384	2800	845.98	950	107.77
Dibenz[a,h]anthracene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A	6.22	63.4	260	134.61	230	6.22
Dibenzofuran		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					110	110
Diethyl phthalate		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					6	6
Dimethyl phthalate		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					6	6
Di-n-butyl phthalate		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					58	58
Di-n-octyl phthalate		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	280	<150	<170	<160	<150	600	<180	<160	280	600	HA-126 14-16'					61	61
Fluoranthene		<320	<200	<210	<120	2,500	<220	<200	<210	<210	<140	3,400	<230	<220	1,100	<230	<210	<160	<160	1,100	<170	<190	<150	<170	<160	<150	<160	<180	<160	1,100	3,400	HA-120 0-2'	112.82	600	5100	1493.54	1300	112.82
Fluorene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A	21.17	19	540	144.35	120	19
Hexachlorobenzene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					6	6

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Attachment D43

TABLE 2-2 (Revised 23 May 2008)
SEDIMENT RESULTS AND COMPARISON TO SEDIMENT GUIDELINES
AES SPARROWS POINT, BALTIMORE, MD

Chemical	TEF	HA-116	HA-116	HA-117	HA-117	HA-118	HA-118	HA-118	HA-119	HA-119	HA-119	HA-120	HA-120	HA-120	HA-121	HA-121	HA-121	HA-122	HA-122	HA-123	HA-123	HA-124	HA-124	HA-125	HA-125	HA-126	HA-126	HA-127	HA-127	Min	Max	Sample with Max Concentration	TEL	ERL	ERM	PEL	AET	Lowest Guideline (2)
		Sample ID/Depth																															Marine Sediment Guidelines(1)					
From MSL (ft)																																						
From ToS (ft)		0.0-2.0	10.0-12.0	0.0-2.0	8.0-10.0	0.0-2.0	10.0-12.0	22.0-24.0	0.0-2.0	6.0-8.0	14.0-16.0	0.0-2.0	8.0-10.0	15.0-17.0	0.0-2.0	14.0-16.0	26.0-27.0	0.0-2.0	8.0-10.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0	0.0-2.0	10.0-12.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0									
		Shall	Deep	Shall	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep									
Hexachlorobutadiene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					1.3	1.3
Hexachlorocyclopentadiene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Hexachloroethane		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					73	73
Indeno[1,2,3-cd]pyrene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	1,200	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	1,200	1,200	HA-120 0-2'					600	600
Isophorone		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
Naphthalene		<320	<200	390	<120	7,900	<220	<200	<210	<210	<140	3,000	<230	<220	2,200	<230	<210	<160	<160	850	<170	<190	<150	<170	<160	<150	<160	<180	<160	390	7,900	HA-118 0-2'	34.57	160	2100	390.64	230	34.57
Nitrobenzene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					21	21
N-Nitroso-di-n-propylamine		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A						
N-Nitrosodiphenylamine		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					28	28
Pentachlorophenol		<810	<490	<530	<310	<1000	<540	<500	<530	<530	<350	<660	<580	<550	<800	<570	<540	<400	<410	<1100	<420	<470	<370	<420	<400	<380	<400	<440	<400	0	0	N/A					17	17
Phenanthrene		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	540	<230	<220	460	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	460	540	HA-120 0-2'	86.68	240	1500	543.53	660	86.68
Phenol		<320	<200	<210	<120	<400	<220	<200	<210	<210	<140	<270	<230	<220	<320	<230	<210	<160	<160	<440	<170	<190	<150	<170	<160	<150	<160	<180	<160	0	0	N/A					130	130
Pyrene		<320	<200	<210	<120	2,100	<220	<200	<210	<210	<140	3,100	<230	<220	1,300	<230	<210	<160	<160	1,100	<170	<190	<150	<170	<160	<150	<160	<180	<160	1,100	3,100	HA-120 0-2'	152.66	665	2600	1397.6	2400	152.66
Pesticides (ug/kg)																																						
4,4-DDD		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A	1.22	2	20	7.81	16	1.22
4,4-DDE		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A	2.07	2.2	27	374.17	9	2.07
4,4-DDT		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A	1.19	1	7	4.77	12	1
a-BHC		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
a-Chlordane		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A	2.26	0.5	6	4.79	2.8	0.5
Aldrin		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A					9.5	9.5
b-BHC		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
d-BHC		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Dieldrin		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A	0.715	0.02	8	4.3	1.9	0.02
Endosulfan I		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Endosulfan II		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Endosulfan Sulfate		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Endrin		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Endrin Aldehyde		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Endrin Ketone		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
g-BHC (Lindane)		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
g-Chlordane		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A	2.26	0.5	6	4.79	2.8	0.5
Heptachlor		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A					0.3	0.3
Heptachlor Epoxide		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Methoxychlor		<25	<20	<20	<13	<32	<21	<20	<23	<24	<15	<25	<26	<23	<30	<24	<23	<18	<18	<33	<18	<20	<17	<19	<18	<16	<18	<19	<17	0	0	N/A						
Toxaphene		<250	<200	<200	<130	<320	<210	<190	<230	<240	<150	<250	<260	<230	<290	<240	<230	<180	<180	<330	<180	<200	<170	<190	<180	<160	<180	<190	<170	0	0	N/A						
PCBs (mg/kg)																																						
Aroclor 1016		<0.12	NA	<0.098	NA	<0.16	<0.11	NA	<0.11	<0.12	NA	<0.13	<0.13	NA	<0.15	<0.12	NA	<0.089	NA	<0.17	NA	<0.099	NA	<0.094	NA	<0.082	NA	<0.095	NA	0	0	N/A	0.02155	0.0227	0.18	0.18879	0.13	0.02155
Aroclor 1221		<0.12	NA	<0.098	NA	<0.16	<0.11	NA	<0.11	<0.12	NA	<0.13	<0.13	NA	<0.15	<0.12	NA	<0.089	NA	<0.17	NA	<0.099	NA	<0.094	NA	<0.082	NA	<0.095	NA	0	0	N/A	0.02155	0.0227	0.18	0.18879	0.13	0.02155
Aroclor 1232		<0.12	NA	<0.098	NA	<0.16	<0.11	NA	<0.11	<0.12	NA	<0.13	<0.13	NA	<0.15	<0.12	NA	<0.089	NA	<0.17	NA	<0.099	NA	<0.094	NA	<0.082	NA	<0.095	NA	0	0	N/A	0.02155	0.0227	0.18	0.18879	0.13	0.02155
Aroclor 1242		<0.12	NA	<0.098	NA	<0.16	<0.11	NA	<0.11	<0.12	NA	<0.13	<0.13	NA	<0.15	<0.12	NA	<0.089	NA	<0.17	NA	<0.099	NA	<0.094	NA	<0.082	NA	<0.095	NA	0	0	N/A	0.02155	0.0227	0.18	0.18879	0.13	0.02155
Aroclor 1248		<0.12	NA	<0.098	NA	<0.16	<0.11	NA	<0.11	<0.12	NA	<0.13	<0.13	NA	<0.15	<0.12	NA	<0.089	NA	<0.17	NA	<0.099	NA	<0.094	NA	<0.082	NA	<0.095	NA	0	0	N/A	0.02155	0.0227	0.18	0.18879	0.13	0.02155
Aroclor 1254		<0.12	NA	<0.098	NA	<0.16	<0.11	NA	<0.11	<0.12	NA	<0.13	<0.13	NA	<0.15	<0.12	NA	<0.089	NA	<0.17	NA	<0.099	NA	<0.094	NA	<0.082	NA	<0.095	NA	0	0	N/A	0.02155	0.0227	0.18	0.18879	0.13	0.02155
Aroclor 1260		<0.12	NA	<0.098	NA	0.19	<0.11	NA	<0.11	<0.12	NA	0.15	<0.13	NA	0.22	<0.12	NA	<0.089	NA	<0.17	NA	<0.099	NA	<0.094	NA	<0.082	NA	<0.095	NA	0.15	0.22	HA-121 0-2'	0.02155	0.0227	0.18	0.18879	0.13	0.02155
PCB Congeners (pg/g)																																						
8-DiCB		NA	8.43	NA	8.57	NA	NA	9.23	NA	NA	13.6	NA	NA	9.38	NA	NA	9.51	NA	22	NA	9.74	NA	8.07	NA	6.46	NA	7.65	NA	8.02	6.46	22.0	HA-122 8-10'						
18,30-TrCB		NA	5.76	NA	12	NA	NA	5.36	NA	NA	7.16	NA	NA	6.34	NA	NA	5.4	NA	51.9	NA	10.1	NA	4.18	NA	4.54	NA	4.88	NA	5.28	4.18	51.9	HA-122 8-10'						
20,28-TrCB		NA	21.3	NA	20.8	NA	NA	26	NA	NA	37.8	NA	NA	25.2	NA	NA	20.4	NA	108	NA	33.3	NA	17.6	NA	15.9	NA	18.6	NA	20.7	15.9	108	HA-122 8-10'						
44,47,65-TeCB		NA	4.57	NA	14	NA	NA	4.77	NA	NA	7.58	NA	NA	6.65	NA	NA	4.67	NA	127	NA	9.58	NA	4.05	NA	3.32	NA	4.86	NA	4.3	3.32	127	HA-122 8-10'						
56-TeCB		NA	2.12	NA	6.75	NA	NA	2.97	NA	NA	4.91	NA	NA	4.87	NA	NA	2.25	NA	43.2	NA	4.41	NA	1.94	NA	ND	NA	1.91	NA	1.73	1.73	43.2	HA-122 8-10'						
66-TeCB		NA	4.66	NA	14	NA	NA	7.12	NA	NA	11.9	NA	NA	10.8	NA	NA	6.43	NA	107	NA	10.4	NA	5.31	NA	3.57	NA	5.02	NA	4.96	3.57	107	HA-122 8-10'						
90,101,113-PeCB		NA	5.35	NA	10.7	NA	NA	5.19	NA	NA	8.1	NA	NA	7.69	NA	NA	6.92	NA	201	NA	14.1	NA	4.72	NA	3.98	NA	6.05	NA	4.28	3.98	201	HA-122 8-10'						
105-PeCB		NA	ND	NA	3.26	NA	NA	1.14	NA	NA	2.15	NA	NA	1.66	NA	NA	1.45	NA	30.6	NA	3.96	NA	0.847	NA	0.914	NA	1.74	NA	1.03	0.85	30.6	HA-122 8-10'						
118-PeCB		NA	3.12	NA	7.12	NA	NA	3.79	NA	NA	5.64	NA	NA	5.22	NA	NA	3.61	NA	91.8	NA	9.77	NA	2.35	NA	2.77	NA	3.58	NA	2.79	2.35	91.8	HA-122 8-10'						
128,166-HxCB		NA	ND	NA	1.18	NA	NA	ND	NA	NA	0.793	NA	NA	ND	NA	NA	ND	NA	22.1	NA	1.77	NA	ND	NA	ND	NA	ND	NA	ND	0.79	22.1	HA-122 8-10'						
129,138,163-HxCB		NA	4.95	NA	7.59	NA	NA	4.32	NA	NA	6.8	NA	NA	7.31	NA	NA	5.77	NA	197	NA	16.7	NA	3.58	NA	4.37	NA	6.71	NA	4.43	3.58	197	HA-122 8-10'						
153,168-HxCB		NA	4.16	NA	6.86	NA	NA	3.45	NA	NA	5.79	NA	NA	7.08	NA	NA	5.69	NA	230	NA	16.2	NA	2.95	NA	3.84	NA	5.63	NA	4.25	2.95	230	HA-122 8-10'						
179-HpCB		NA	ND	NA	0.797	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	35.2	NA	2.43	NA	0.625	NA	ND	NA	ND	NA	ND	0.63	35.2	HA-122 8-10'						
180,193-HpCB		NA	1.31	NA	3	NA	NA	ND	NA	NA	2.39	NA	NA	3.23	NA	NA	2.45	NA	106	NA	8.28	NA	1.22	NA	ND	NA	2.6	NA	2.59	1.22	106	HA-122 8-10'						
187-HpCB		NA	1.49	NA	2.26	NA	NA	ND	NA	NA	2.04	NA	NA	2.58	NA	NA	1.99	NA	100	NA	6.21	NA	0.679	NA	ND	NA	2.02	NA	1.71	0.68	100	HA-122 8-10'						
195-OcCB		NA	ND	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	7.94	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	7.94	7.94	HA-122 8-10'						
206-NoCB		NA	ND	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	33.2	NA	1.52	NA	ND	NA	ND	NA	ND	NA	ND	1.52	33.2	HA-122 8-10'						
209-DeCB		NA	ND	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	61.9	NA	2.15	NA	ND	NA	ND	NA	ND	NA	ND	2.15	61.9	HA-122 8-10'						
"Aroclor-based" total PCB data (mg/kg)(3)			0.00013444		0.000237774			0.00014668			0.000233306			0.00019602			0.00015308		0.00315168		0.00032124		0.000116242		0.000099328		0.0001425		0.00013214				0.02155	0.0227	0.18	0.18879	0.13	0.02155
Petroleum Hydrocarbons (mg/kg)																																						
Diesel Range Organics		100	<20	120	<12	700	21	28	150	<23	<14	360	28	28	360	45	22	21	88	4,900	27	150	62	18	39	57	31	47	49	18	4,900	HA-123 0-2'						
Oil & Grease		5,300	55	2,300	<30	21,000	<51	130	71	<60	130	10,000	<61	<56	12,000	<58	<56	<39	190	11,000	260	340	70	320	230	150	530	150	110	55	21,000	HA-118 0-2'						
Gasoline Range Organics		<0.6	<0.39	<0.45	<0.19	4.1	<0.39	<0.37	<0.4	<0.47	<0.28	0.87	<0.48	<0.4	<0.67	<0.42	<0.44	<0.29	<0.23	2.5	<0.3	<0.35	<0.27	<0.31	<0.3	<0.27	<0.3	<0.31	<0.27	0.87	4.1	HA-118 0-2'						
Dioxins (ng/kg)																																						
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A						
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	1.07	0	0	0	0	1.02	0	0.213	0.41	0	0	0	0	0	0	0	0	0	0.000	1.07	HA-120 0-2'						
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.911	0	0	0	0	1.76	0	0	0.317	0	0	0	0	0	0	0.308	0	0	0.000	1.76	HA-121 26-27'						
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	6.19	0	0	0.538	0.183	3.15	0	0	1.38	0	0	0	0	0	0	0.666	0	0.12	0.000	6.19	HA-120 0-2'						
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	3.96	0	0	0.425	0	9.03	0	1.75	1.28	0	0	0	0	0	0	2.74	0	0	0.000	9.03	HA-121 26-27'						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.01	NA	NA	NA	NA	NA	NA	NA	13.1	18.1	12.4	91.7	6.87	4.84	9.33	4.67	132	0.59	40.6	21.6	1.57	3.22	0.531	1.34	0.425	2.43	43.8	2.89	2.29	0.425	132	HA-121 26-27'						
Octachlorodibenzo-p-dioxin (OCDD)	0.0003	NA	NA	NA	NA	NA	NA	NA	585	642	443	1600	200	114	134	77.4	4220	12.2	1250	276	14.1	39.4	8.62	20.5	7.01	29.8	1210	29.9	22.9	7.01	4,220	HA-121 26-27'						
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	2.49	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.49	2.49	HA-120 0-2'						
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.03	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	1.02	ND	ND	0.518	ND	ND	ND	ND	1.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.518	1.26	HA-123 0-2'						
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.3	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	1.92	ND	ND	ND	ND	ND	ND	ND	1.56	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.56	1.92	HA-120 0-2'						
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	3.64	ND	ND	0.795	0.107	ND	ND	0.321	3.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.107	3.64	HA-120 0-2'						
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	1.32	ND	ND	0.196	ND	ND	ND	0.133	1.27	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.133	1.32	HA-120 0-2'						
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A						
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	2.03	ND	ND	ND	ND	ND	ND	ND	1.65	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.65	2.03	HA-120 0-2'						
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.01	NA	NA	NA	NA	NA	NA	NA	0.589	ND	ND	23.4	ND	0.497	2.77	0.633	0.557	ND	1.34	8.42	0.324	0.45	ND	ND	ND	0.236	0.278	0.386	0.446	0.236	23.4	HA-120 0-2'						
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.01	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	2.09	ND	ND	0.485	ND	ND	ND	ND	1.29	ND	ND	ND	ND	ND	ND	ND	1.51	1.17	0.485	2.09	HA-120 0-2'						
Octachlorodibenzofuran (OCDF)	0.0003	NA	NA	NA	NA	NA	NA	NA	0.953	ND	ND	73.9	0.209	1.39	9.08	2.17	1.16	ND	3.16	18.1	1.12	1.24	ND	ND	0.171	0.836	0.786	1.17	1.53	0.171	73.9	HA-120 0-2'						
																		ND																				
Tetrachlorodibenzo-p-dioxins (TCDD), Total		NA	NA	NA	NA	NA	NA	NA	ND	0.926	0.923	7.65	ND	ND	ND	ND	14.2	ND	32.2	0.749	ND	0.741	ND	ND	ND	0.901	6.09	0.344	ND	0.344	32.2	HA-122 8-10'						
Pentachlorodibenzo-p-dioxin (PeCDD), Total		NA	NA	NA	NA	NA	NA	NA	0.578	4.65	1.95	10	0.422	ND	ND	ND	38.9	ND	29	ND	ND	0.356	ND	0.238	ND	1.11	10	0.206	ND	0.206	38.9	HA-121 26-27'						
Hexachlorodibenzo-p-dioxins (HxCDD), Total		NA	NA	NA	NA	NA	NA	NA	8.95	26.1	15.5	82.4	8.31	3.96	6.19	3.11	209	0.592	285	14.3	0.242	3.76	ND	3.97	ND	8.47	79.3	1.99	1.61	0.242	285	HA-122 8-10'						
Heptachlorodibenzo-p-dioxins (HpCDD), Total		NA	NA	NA	NA	NA	NA	NA	55.1	90	56.9	246	31.4	22.8	24.8	13.2	670	1.9	448	56.5	3.86	12.5	2.63	7.46	2.45	13.5	279	9.77	5.01	1.90	670	HA-121 26-27'						
Tetrachlorodibenzofurans (TCDF), Total		NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	21.2	0.199	ND	1.5	ND	0.391	ND	0.408	5.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.199	21.2	HA-120 0-2'						
Pentachlorodibenzofurans (PeCDF), Total		NA	NA	NA	NA	NA	NA	NA	0.269	ND	ND	28.3	ND	ND	0.79	ND	0.687	ND	0.501	11.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.269	28.3	HA-120 0-2'						
Hexachlorodibenzofurans (HxCDF), Total		NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	29.5	0.123	0.21	3.68	0.771	0.681	1.35	0.863	14.8	ND	ND	ND	ND	ND	ND	0.233	0.282	0.716	0.123	29.5	HA-120 0-2'						
Heptachlorodibenzofurans (HpCDF), Total		NA	NA	NA	NA	NA	NA	NA	0.589	ND	ND	57.7	ND	ND	7.62	3.09	1.43	ND	2.66	19.1	0.324	0.45	ND	ND	ND	ND	ND	1.51	1.17	0.324	57.7	HA-120 0-2'						
Toxic Equivalents (4)		NA	NA	NA	NA	NA	NA	NA	0.312676	0.3736	0.2569	5.40477	0.1287627	0.087987	0.379714	0.105901	5.005918	0.0096	1.228748	2.23183	0.23506	0.048892	0.007896	0.01955	0.0064043	0.035851	1.1754158	0.042081	0.046689	0.006	5.40	HA-121 26-27'					3.6	3.6
Metals (mg/kg)																																						
Arsenic		30	5.6	36	5.2	130	8.6	9.1	15	11	4	35	9.1	7.9	31	8	6.2	6	3.3	41	6.9	4.8	9.1	6.5	7.3	9	8.1	3.5	6.6	3.3	130	HA-118 0-2'	7.24	8.2	70	41.6	35	7.24
Barium		91	40	91	16	140	52	56	52	57	30	95	54	54	96	49	46	80	110	200	67	110	120	120	73	120	74	110	78	16	200	HA-123 0-2'					48	48
Cadmium		<4.5	<2.9	<2.8	<2.4	8.5	<3.1	<2.9	<3.6	<3.2	<2.1	4.4	<3.4	<3.3	<4.5	<3.3	<3.1	<2.3	<2.4	<6.9	<2.4	<2.8	<2.1	<2.9	<2.1	<2	<2.2	<2.6	<2.3	4.4	8.5	HA-118 0-2'	0.676	1.2	9.6	4.21	3	0.676
Chromium		180	27	180	79	1,300	37	38	46	43	21	480	40	38	450	37	35	29	33	720	26	41	25	37	29	36	29	32	26	21	1,300	HA-118 0-2'	52.3	81	370	160.4	62	52.3
Copper		80	11	78	7.3	450	14	15	21	17	7.9	150	15	14	160	14	13	16	18	630	16	24	13	20	18	17	18	19	14	7.3	630	HA-123 0-2'	18.7	34	270	108.2	390	18.7
Iron		73,000	30,000	41,000	17,000	190,000	35,000	36,000	35,000	43,000	20,000	62,000	40,000	37,000	72,000	37,000	34,000	39,000	53,000	150,000	44,000	42,000	41,000	61,000	52,000	30,000	49,000	35,000	44,000	17,000	190,000	HA-118 0-2'					220,000	220,000
Lead		130	15	170	21	600	21	22	28	25	11	250	22	21	230	20	18	19	21	450	20	24	18	29	24	17	23	18	20	11	600	HA-118 0-2'	30.24	46.7	218	112.18	400	30.24

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TABLE 2-2 (Revised 23 May 2008)
SEDIMENT RESULTS AND COMPARISON TO SEDIMENT GUIDELINES
AES SPARROWS POINT, BALTIMORE, MD
PAGE 3 OF 3

Chemical	TEF	Sample ID/Depth HA-116	HA-116	HA-117	HA-117	HA-118	HA-118	HA-118	HA-119	HA-119	HA-119	HA-120	HA-120	HA-120	HA-121
From MSL (ft)															
From ToS (ft)		0.0-2.0	10.0-12.0	0.0-2.0	8.0-10.0	0.0-2.0	10.0-12.0	22.0-24.0	0.0-2.0	6.0-8.0	14.0-16.0	0.0-2.0	8.0-10.0	15.0-17.0	0.0-2.0
		Shall	Deep	Shall	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall	Inter	Deep	Shall
Mercury		<0.91	<0.59	0.6	<0.47	1.3	<0.62	<0.59	<0.72	<0.63	<0.41	<0.75	<0.69	<0.66	<0.91
Selenium		<4.5	<2.9	4.8	<2.4	20	<3.1	<2.9	<3.6	<3.2	<2.1	5.4	<3.4	<3.3	<4.5
Silver		<4.5	<2.9	<2.8	<2.4	<6	<3.1	<2.9	<3.6	<3.2	<2.1	<3.7	<3.4	<3.3	<4.5
TBT Parameters (ng/g)															
Tributyltin[+]		ND	ND	6	ND	ND	ND	ND	ND	ND	ND	87	ND	ND	25
Dibutyltin[+2]		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Monobutyltin[+3]		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Miscellaneous Parameters															
Percent Solids (%)		28	49	42	84	22	49	51	46	41	69	35	41	45	27
Total Cyanide (mg/kg)		3.53	<0.34	<0.38	<0.23	1.81	<0.37	<0.33	<0.37	<0.56	<0.33	<0.54	<0.56	<0.51	<0.77
Total Kjeldahl Nitrogen (mg/kg)		4,200	1,900	2,000	<230	3,800	2,400	2,200	2,400	2,400	1,400	1,900	2,500	2,300	2,900
Phosphorus (mg/kg)		740	350	730	22	6,300	320	400	970	420	320	2,400	400	450	2,400
Total Organic Carbon (mg/kg)		<350	<200	<240	NA	<460	<200	<190	<220	<240	<140	<290	<240	<220	<370
pH		7.6	8.1	7.7	7.9	7.6	8.5	8.3	8.2	8.3	8.2	8.3	8.4	8.2	8.1

Chemical	Sample ID/Depth HA-121	HA-121	HA-122	HA-122	HA-123	HA-123	HA-124	HA-124	HA-125	HA-125	HA-126	HA-126	HA-127	HA-127	Min	Max	Sample with Max Concentration	Marine Sediment Guidelines[1] TEL	ERL	ERM	PEL	AET	Lowest Guideline[2]
From MSL (ft)																							
From ToS (ft)	14.0-16.0	26.0-27.0	0.0-2.0	8.0-10.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0	0.0-2.0	10.0-12.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0									
	Inter	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep									
Mercury	<0.66	<0.62	<0.46	<0.48	<1.4	<0.47	<0.55	<0.42	<0.59	<0.41	<0.41	<0.44	<0.52	<0.46	0.6	1.3	HA-118 0-2'	0.13	0.15	0.71	0.696	0.41	0.13
Selenium	<3.3	<3.1	<2.3	<2.4	<6.9	<2.4	<2.8	<2.1	<2.9	<2.1	<2	<2.2	<2.6	<2.3	4.8	20	HA-118 0-2'					1	1
Silver	<3.3	<3.1	<2.3	<2.4	<6.9	<2.4	<2.8	<2.1	<2.9	<2.1	<2	<2.2	<2.6	<2.3	0	0	N/A	0.73	1	3.7	1.77	3.1	0.73
TBT Parameters (ng/g)																							
Tributyltin[+]	ND	ND	ND	68	1900	ND	5	ND	ND	ND	ND	ND	39	ND	5	1,900	HA-123 0-2'						
Dibutyltin[+2]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	N/A						
Monobutyltin[+3]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	N/A						
Miscellaneous Parameters																							
Percent Solids (%)	43	45	63	63	21	61	57	69	61	65	70	63	59	65	21	84	HA-117 8-10'						
Total Cyanide (mg/kg)	<0.49	<0.47	<0.27	<0.3	2.43	<0.29	<0.33	<0.28	<0.31	<0.29	<0.26	<0.27	<0.27	<0.28	1.81	3.53	HA-116 0-2'						
Total Kjeldahl Nitrogen (mg/kg)	2,600	1,300	690	1,200	2,100	1,600	2,200	1,700	1,900	1,700	1,400	1,700	1,700	1,800	690	4,200	HA-116 0-2'						
Phosphorus (mg/kg)	430	420	670	1,200	1,600	330	460	300	290	280	210	280	300	380	22	6,300	HA-118 0-2'						
Total Organic Carbon (mg/kg)	<230	<220	<160	<160	<490	<160	<170	<140	<160	<150	<140	<160	<170	<150	0	0	N/A						
pH	8.2	8.3	6.9	6.8	8.3	7.3	7	8	6.8	7.1	6.7	7.2	6.4	7.7	6.4	8.5	HA-118 10-12'						

Notes:
- Nondetected results show the sample reporting limit preceded by a "<" symbol.
- Positive results with concentrations greater than the Lowest Guideline are shaded yellow.
- Nondetected results with detection limits greater than the Lowest Guideline are shaded gray.

Acronyms:
TEL = Threshold Effects Level
PEL = Probable Effect Level
ERL = Effects Range-Low
ERM = Effects Range-Median
AET = Apparent Effects Threshold
PCB = Polychlorinated Biphenyl
Min = Minimum sample concentration
Max = Maximum sample concentration
ND = Nondetect
NA = Not Analyzed/Will not be analyzed
N/A = Not Available/Not Applicable
MSL = Mean Sea Level
ToS = Top of Sediment

Footnotes:
(1) Values are from NOAA Screening Quick Reference Tables (Buchman, 1999).
(2) The lowest guideline was used for conservativeness.
(3) Per NOAA Technical Memorandum NMFS-NE-157 the sum of concentrations of 18 specific PCB congeners was multiplied by 2 to generate an approximation of "Aroclor-based" total PCB data for comparison with the historical total PCB data.
(4) Aggregate toxicity is represented by calculating a single value for all dioxins combined in terms of the most toxic dioxin congener 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) based on the World Health Organization Toxic Equivalency Factors for Fish (Van den Berg, et al 2006)
(5) Table was revised 12 October 2007 to include tributyltin results

TABLE 2-3 (Revised 23 May 2008)
WATER RESULTS AND COMPARISON TO MARINE CRITERIA
AES SPARROWS POINT, BALTIMORE, MD
PAGE 1 OF 3

Chemical	TEF	Sample ID/Depth HA-116	HA-116	HA-117	HA-117	HA-118	HA-118	HA-119	HA-119	HA-120	HA-120	HA-121	HA-121	HA-122	HA-122	HA-123	HA-123	HA-124	HA-124	HA-125	HA-125	HA-126	HA-126	HA-127	HA-127	Blank River Water	Min	Max	Sample with Max Concentration	Marine Ambient Water Quality Criteria[1] Acute	Chronic	Notes
		NA																								NA						
		0.0-2.0	10.0-12.0	0.0-2.0	8.0-10.0	0.0-2.0	10.0-12.0	0.0-2.0	6.0-8.0	0.0-2.0	8.0-10.0	0.0-2.0	14.0-16.0	0.0-2.0	8.0-10.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0	0.0-2.0	10.0-12.0	0.0-2.0	14.0-16.0	0.0-2.0	14.0-16.0	NA						
		Shall	Deep	Shall	Deep	Shall	Inter	Shall	Inter	Shall	Inter	Shall	Inter	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	Shall	Deep	NA						
Volatile Organics (ug/L)																																
1,1,1-Trichloroethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	31200		
1,1,2,2-Tetrachloroethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	9020		
1,1,2-Trichloroethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,1,2-Trichlorotrifluoroethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,1-Dichloroethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,1-Dichloroethene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,2,4-Trichlorobenzene		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0	0	N/A	160	129	
1,2-Dibromo-3-chloropropane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,2-Dibromoethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,2-Dichlorobenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	1970	129	
1,2-Dichloroethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	113000		
1,2-Dichloropropane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,3-Dichlorobenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
1,4-Dichlorobenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	1970	129	
2-Butanone (MEK)		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
2-Hexanone (MBK)		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
4-Methyl-2-pentanone (MIBK)		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
Acetone		<10	<50	<10	<15	<10	<20	<10	<20	<20	<40	<55	<25	<20	<20	<50	<80	<60	<70	<40	<80	<65	<90	<80	<85	<10	0	0	N/A			
Benzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	5100	700	
Bromodichloromethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	12000	6400	
Bromoform		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Bromomethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Carbon disulfide		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
Carbon tetrachloride		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	50000		
Chlorobenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	160	129	
Chloroethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Chloroform		2	2	2	3	2	2	3	2	1	<1	1	<1	3	4	2	4	4	4	5	5	4	4	4	4	6	1	6	BLANK			
Chloromethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
cis-1,2-Dichloroethene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	224000		
cis-1,3-Dichloropropene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Cyclohexane		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
Dibromochloromethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	12000	6400	
Dichlorodifluoromethane		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	12000	6400	
Diisopropyl ether (DIPE)		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Ethyl t-butyl ether (ETBE)		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Ethylbenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	430		
Isopropylbenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
m&p-Xylene		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0	0	N/A			
Methyl acetate		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
Methyl t-butyl ether (MTBE)		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Methylcyclohexane		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
Methylene chloride		<50	<70	<40	<45	<40	<45	<35	<50	<50	<50	<55	<50	<100	<75	<50	<70	<70	<80	<75	<80	<60	<75	<60	<80	<10	0	0	N/A	12000	6400	
o-Xylene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Styrene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
tert-Amyl alcohol (TAA)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	0	0	N/A			
tert-Amyl ethyl ether (TAEE)		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
tert-Amyl methyl ether (TAME)		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
tert-Butanol (TBA)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	0	0	N/A			
Tetrachloroethene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	10200	450	
Toluene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	6300	5000	
trans-1,2-Dichloroethene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	224000		
trans-1,3-Dichloropropene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A			
Trichloroethene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	2000		
Trichlorofluoromethane		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A	12000	6400	
Vinyl chloride		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	224000		
Semivolatile Organics (ug/L																																
1,1-Biphenyl		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2,4,5-Trichlorophenol		<43	<29	<33	<28	<29	<30	<27	<27	<29	<34	<30	<42	<28	<30	<27	<27	<27	<26	<27	<28	<27	<30	<27	<26	<27	0	0	N/A	240	11	
2,4,6-Trichlorophenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2,4-Dichlorophenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2,4-Dimethylphenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2,4-Dinitrophenol		<43	<29	<33	<28	<29	<30	<27	<27	<29	<34	<30	<42	<28	<30	<27	<27	<27	<26	<27	<28	<27	<30	<27	<26	<27	0	0	N/A			
2,4-Dinitrotoluene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	590	370	
2,6-Dinitrotoluene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2-Chloronaphthalene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	7.5		
2-Chlorophenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2-Methylnaphthalene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
2-Methylphenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2-Nitroaniline		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
2-Nitrophenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
3,3-Dichlorobenzidine		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
3-Nitroaniline		<43	<29	<33	<28	<29	<30	<27	<27	<29	<34	<30	<42	<28	<30	<27	<27	<27	<26	<27	<28	<27	<30	<27	<26	<27	0	0	N/A			
4,6-Dinitro-2-methylphenol		<43	<29	<33	<28	<29	<30	<27	<27	<29	<34	<30	<42	<28	<30	<27	<27	<27	<26	<27	<28	<27	<30	<27	<26	<27	0	0	N/A			
4-Bromophenyl phenyl ether		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
4-Chloro-3-methylphenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
4-Chloroaniline		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	160	129	
4-Chlorophenyl phenyl ether		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
4-Methylphenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
4-Nitroaniline		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
4-Nitrophenol		<43	<29	<33	<28	<29	<30	<27	<27	<29	<34	<30	<42	<28	<30	<27	<27	<27	<26	<27	<28	<27	<30	<27	<26	<27	0	0	N/A	4850		
Acenaphthene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	970	710	
Acenaphthylene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Acetophenone		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Anthracene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Atrazine		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Benzo[a]anthracene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Benzo[a]pyrene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Benzo[b]fluoranthene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Benzo[g,h,i]perylene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Benzo[k]fluoranthene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Bis (2-chloroethoxy) methane		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Bis (2-chloroethyl) ether		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Bis (2-chloroisopropyl) ether		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Bis (2-ethylhexyl) phthalate		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	400	360	
Butyl benzyl phthalate		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	2944	3.4	

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TABLE 2-3 (Revised 23 May 2008)
WATER RESULTS AND COMPARISON TO MARINE CRITERIA
AES SPARROWS POINT, BALTIMORE, MD

Chemical	TEF	HA-116 0.0-2.0 Shall	HA-116 10.0-12.0 Deep	HA-117 0.0-2.0 Shall	HA-117 8.0-10.0 Deep	HA-118 0.0-2.0 Shall	HA-118 10.0-12.0 Inter	HA-119 0.0-2.0 Shall	HA-119 6.0-8.0 Inter	HA-120 0.0-2.0 Shall	HA-120 8.0-10.0 Inter	HA-121 0.0-2.0 Shall	HA-121 14.0-16.0 Inter	HA-122 0.0-2.0 Shall	HA-122 8.0-10.0 Deep	HA-123 0.0-2.0 Shall	HA-123 14.0-16.0 Deep	HA-124 0.0-2.0 Shall	HA-124 14.0-16.0 Deep	HA-125 0.0-2.0 Shall	HA-125 10.0-12.0 Deep	HA-126 0.0-2.0 Shall	HA-126 14.0-16.0 Deep	HA-127 0.0-2.0 Shall	HA-127 14.0-16.0 Deep	Blank River Water NA NA NA	Min	Max	Sample with Max Concentration	Marine Ambient Water Quality Criteria[1] Acute	Chronic	Notes
Caprolactam		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Carbazole		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Chrysene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Dibenz[a,h]anthracene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Dibenzofuran		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
Diethyl phthalate		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	2944	3.4	
Dimethyl phthalate		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	2944	3.4	
Di-n-butyl phthalate		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	2944	3.4	
Di-n-octyl phthalate		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	2944	3.4	
Fluoranthene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	40	16	
Fluorene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Hexachlorobenzene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	160	129	
Hexachlorobutadiene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	32		
Hexachlorocyclopentadiene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	7		
Hexachloroethane		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	940		
Indeno[1,2,3-cd]pyrene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Isophorone		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	12900		
Naphthalene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	2350		
Nitrobenzene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	6680		
N-Nitroso-di-n-propylamine		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A			
N-Nitrosodiphenylamine		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	3300000		
Pentachlorophenol		<43	<29	<33	<28	<29	<30	<27	<27	<29	<34	<30	<42	<28	<30	<27	<27	<27	<26	<27	<28	<27	<30	<27	<26	<27	0	0	N/A	13	7.9	
Phenanthrene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	7.7	4.6	
Phenol		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	5800		
Pyrene		<17	<12	<13	<11	<11	<12	<11	<11	<12	<14	<12	<17	<11	<12	<11	<11	<11	<10	<11	<11	<11	<12	<11	<11	<11	0	0	N/A	300		
Pesticides (ug/L)																																
4,4-DDD		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	3.6		
4,4-DDE		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	14		
4,4-DDT		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.065	0.0005	
a-BHC		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.34		
a-Chlordane		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.045	0.002	
Aldrin		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.65		
b-BHC		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.34		
d-BHC		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.34		
Dieldrin		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.355	0.00095	
Endosulfan I		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.017	0.00435	
Endosulfan II		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.017	0.00435	
Endosulfan Sulfate		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A			
Endrin		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.0185	0.00115	
Endrin Aldehyde		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A			
Endrin Ketone		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A			
g-BHC (Lindane)		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.08		
g-Chlordane		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.045	0.002	
Heptachlor		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.0265	0.0018	
Heptachlor Epoxide		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A	0.0265	0.0018	
Methoxychlor		<0.1	<0.08	<0.1	<0.08	<0.09	<0.09	<0.08	<0.09	<0.09	<0.09	<0.09	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.1	<0.08	<0.1	<0.09	<0.1	<0.09	<0.09	<0.08	0	0	N/A		0.03	
Toxaphene		<3	<2	<3	<2	<2	<2	<2	<2	<2	<2	<2	<3	<2	<2	<2	<2	<2	<3	<2	<3	<2	<2	<2	<2	<2	0	0	N/A	0.21	0.0002	
PCBs (ug/L)																																
Aroclor 1016		<0.8	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.7	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	0	0	N/A	10	0.03	
Aroclor 1221		<0.8	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.7	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	0	0	N/A	10	0.03	
Aroclor 1232		<0.8	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.7	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	0	0	N/A	10	0.03	
Aroclor 1242		<0.8	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.7	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	0	0	N/A	10	0.03	
Aroclor 1248		<0.8	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.7	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	0	0	N/A	10	0.03	
Aroclor 1254		<0.8	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.7	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	0	0	N/A	10	0.03	
Aroclor 1260		<0.8	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.7	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	0	0	N/A	10	0.03	
Petroleum Hydrocarbons (mg/L)																																
Diesel Range Organics		<0.33	<0.21	<0.25	<0.21	<0.21	<0.22	<0.21	<0.23	<0.21	<0.23	<0.22	<0.28		<0.25	0.62	<0.24	<0.24	<0.3	<0.21	<0.26	0.22	<0.24	<0.21	<0.21	<0.2	0.22	0.62	HA-123 0-2'			
Oil & Grease		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A			
Gasoline Range Organics		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	0.2	HA-123 0-2'			
Dioxins (pg/L)																																
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	1.4	0	1.5	2.56	0	0	0	0	0	0	N/A	0	2.56	HA-124 14-16'			
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	NA	NA	0	0	0	0	0	0	0	10.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	10.4	HA-120 8-10'			
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.01	NA	NA	5.38	0	17.3	23.3	15.9	15.1	6.8	229	6.52	7.76	3.38	0	17.5	3.84	63.8	113	0	1.6	2.18	3.64	3.42	3.31	N/A	0	229	HA-120 8-10'			
Octachlorodibenzo-p-dioxin (OCDD)	0.0003	NA	NA	185	36.1	305	1320	991	770	116	8950	123	317	125	53.1	195	27.2	938	1760	25.1	28.8	17	41.2	33	42.3	N/A	17	8950	HA-120 8-10'			
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.03	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.3	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	0	0	0	0	0	0	0	0	0	0	1.63	0	0	0	1	1.46	0	0	0	0	0	0	N/A	0.00	1.63	HA-122 0-2'			
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.01	NA	NA	0	0	5.03	0	0	0	1.09	0.943	1.37	0	0	0	2.29	0	6.78	12.6	0	0	0	0	0	0	N/A	0	12.6	HA-124 14-16'			
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.01	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.68	0	N/A	0	4.68	HA-127 0-2'			
Octachlorodibenzofuran (OCDF)	0.0003	NA	NA	2.2	2.18	9.93	0	0	0	3.4	2.56	4.97	0	0	2.01	8.47	0	38	78	0	0	0	0	0	0	N/A	0	78.0	HA-124 14-16'			
Tetrachlorodibenzo-p-dioxins (TCDD), Total		NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
Pentachlorodibenzo-p-dioxin (PeCDD), Total		NA	NA	0	0	0	0	0	0	0	35.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	35.2	HA-120 8-10'			
Hexachlorodibenzo-p-dioxins (HxCDD), Total		NA	NA	0	0	14.4	18.8	8.58	0	1.7	278	2.19	6.32	0	3.76	6.8	1.3	19.3	8.31	0	1.39	3.68	2.66	2.39	2.3	N/A	0.00	278	HA-120 8-10'			
Heptachlorodibenzo-p-dioxins (HpCDD), Total		NA	NA	20.7	3.01	44	114	56	67.4	18.6	1190	17.6	41.1	12.3	0	43.7	0	159	275	5.72	6.29	5.3	13.3	8.83	0	N/A	0	1190	HA-120 8-10'			
Tetrachlorodibenzofurans (TCDF), Total		NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	N/A			
Pentachlorodibenzofurans (PeCDF), Total		NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	1.7	0	0	1.86	0	0	0	0	0	0	N/A	0.00	1.86	HA-124 14-16'			
Hexachlorodibenzofurans (HxCDF), Total		NA	NA	0	0	3.19	0	0	0	0.464	0	0	0	0	0	3.3	0	8.92	14.7	0	0	0	0	0	0	N/A	0	14.7	HA-124 14-16'			
Heptachlorodibenzofurans (HpCDF), Total		NA	NA	0	0	11.7	0	0	0	2.5	0.943	1.37	0	0	0	0	0	31.9	61.1	0	0	0	0	0	0	N/A	0	61.1	HA-124 14-16'			
Toxic Equivalents		NA	NA	0.10996	0.011484	0.317779	0.629	0.4563	0.382	0.11472	6.025198	0.117291	0.1727	0.2343	0.016533	0.398941	0.04656	1.2486	2.2094	0.00753	0.02464	0.269	0.04876	0.0909	0.04579	N/A	0.00753	6.025198	HA-120 8-10'			
Metals (ug/L)																																
Arsenic		27	20	6.6	<5	19	23	16	8.2	15	8.7	15	13	<5	<5	11	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	6.6	27	HA-116 0-2'	2319		LOEL, not criterion
Barium		82	56	200	82	280	65	90	63	290	71	110	71	190	840	210	780	780	740	950	740	750	720	780	770	97	56	950	HA-125 0-2'			
Cadmium		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A	42	9.3	
Chromium		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A	1100	50	Hexavalent Cr
Copper		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A	4.8	3.1	

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TABLE 2-3 (Revised 23 May 2008)
WATER RESULTS AND COMPARISON TO MARINE CRITERIA
AES SPARROWS POINT, BALTIMORE, MD
PAGE 3 OF 3

Sample ID/Depth

Chemical	TEF	HA-116 0.0-2.0 Shall	HA-116 10.0-12.0 Deep	HA-117 0.0-2.0 Shall	HA-117 8.0-10.0 Deep	HA-118 0.0-2.0 Shall	HA-118 10.0-12.0 Inter	HA-119 0.0-2.0 Shall	HA-119 6.0-8.0 Inter	HA-120 0.0-2.0 Shall	HA-120 8.0-10.0 Inter	HA-121 0.0-2.0 Shall	HA-121 14.0-16.0 Inter
Iron		1,000	410	1,500	<100	2,800	300	200	250	2,800	280	3,000	220
Lead		5.4	<5	<5	<5	5.3	<5	<5	<5	<5	<5	<5	<5
Mercury		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Selenium		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Silver		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tributyltin (ng/L)													
TBT		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND
DBT		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND
MBT		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Miscellaneous Parameters													
Total Cyanide (mg/L)		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Kjeldahl Nitrogen (mg/L)		28	42	18	8.5	17	21	13	19	31	22	22	9.8
Phosphorus (mg/L)		0.55	1.2	0.27	<0.2	0.33	2.2	0.83	2.3	2.5	0.53	2.8	0.51
TOC (mg/L)		14	17	6.1	4	12	11	5.8	11	14	14	9.1	19
pH		8.1	8.2	7.8	7.5	7.5	8.1	8	8.3	7.9	8.3	7.9	8.4

Chemical	HA-122 0.0-2.0 Shall	HA-122 8.0-10.0 Deep	HA-123 0.0-2.0 Shall	HA-123 14.0-16.0 Deep	HA-124 0.0-2.0 Shall	HA-124 14.0-16.0 Deep	HA-125 0.0-2.0 Shall	HA-125 10.0-12.0 Deep	HA-126 0.0-2.0 Shall	HA-126 14.0-16.0 Deep	HA-127 0.0-2.0 Shall	HA-127 14.0-16.0 Deep	Blank River Water NA NA NA	Min	Max	Sample with Max Concentration	Marine Ambient Water Quality Criteria(1) Acute	Marine Ambient Water Quality Criteria(1) Chronic	Notes
Iron	<100	670	3,200	280	1,900	340	110	<100	2,300	390	3,600	190	<100	110	3,600	HA-127 0-2'			
Lead	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5.3	5.4	HA-116 0-2'	210	8.1	
Mercury	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	N/A	1.8	0.94	
Selenium	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A	290	71	
Silver	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	N/A	0.95		
Tributyltin (ng/L)																			
TBT	ND	18	43	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	4	43	HA-123 0-2'			
DBT	1	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	1	5	HA-123 0-2'			
MBT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	0	0	N/A			
Miscellaneous Parameters																			
Total Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0	0	N/A			
Total Kjeldahl Nitrogen (mg/L)	7.4	19	26	14	31	24	16	21	14	18	15	20	6.8	6.8	42	HA-116 10-12'			
Phosphorus (mg/L)	<0.2	0.22	0.56	0.3	0.24	0.26	0.32	<0.2	0.26	<0.2	0.26	0.21	0.39	0.21	2.8	HA-121 0-2'			
TOC (mg/L)	3.1	5.4	10	6.3	7.5	7	5	6.4	5.6	6.7	7	6.1	3.1	3.1	19	HA-121 14-16'			
pH	7.2	7.1	7.4	7.1	6.4	7.3	7.1	7.4	6.1	7.2	5.8	7	7	5.8	8.4	HA-121 14-16'			

Notes:
- Nondetected results show the sample reporting limit preceded by a "<" symbol.
- Nondetected results for dioxins are reported as "ND".

Acronyms:
PCB = Polychlorinated Biphenyl
Min = Minimum sample concentration
Max = Maximum sample concentration
ND = Nondetect
NA = Not Analyzed/Will not be analyzed
N/A = Not Available/Not Applicable
MSL = Mean Sea Level
ToS = Top of Sediment
LOEL = Lowest Observable Effect Level
TBT = Tributyltin
DBT = Dibutyltin
MBT = Monobutyltin

Footnotes:
(1) Values are from NOAA Screening Quick Reference Tables (Buchman, 1999).
(2) Table was revised 12 October 2007 to include tributyltin results

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TABLE 2-4
COMPARISON OF AES SEDIMENT RESULTS NAD HISTORICAL INFORMATION TO SEDIMENT GUIDELINES
AES SPARROWS POINT, BALTIMORE, MD
PAGE 1 OF 2

Compounds	AVERAGE SEDIMENT CONCENTRATIONS[1]													
	AES Data (2006)			AES Data (2007)			AES Data (2006 & 2007)			Baltimore Harbor Anchorages & Channels (1997)[2]	Sparrows Point Marine Channel (1985)[3]	Baltimore Harbor/Patapsco River/Back River (1997)[4]			
	Shallow	Intermed	Deep	Shallow	Intermed	Deep	Shallow	Intermed	Deep			Overall Study Average	Old Road Bay	Patapsco River	Bear Creek
Semivolatile Organics (ug/kg)														
2-Methylnaphthalene	797	552	ND	126	ND	ND	413	300	ND	ND	N/A	578	363	329	372
Acenaphthene	450	378	ND	126	ND	ND	265	226	ND	N/A	252	92	97	110	79
Acenaphthylene	384	302	ND	126	ND	ND	237	193	ND	N/A	90	218	118	128	245
Anthracene	1337	785	ND	122	ND	ND	697	400	ND	ND	512	449	316	301	261
Benzo[a]anthracene	3027	2343	ND	383	ND	ND	1516	1068	ND	N/A	1800	960	772	461	707
Benzo[a]pyrene	2871	2177	ND	435	ND	ND	1479	996	ND	278	N/A	1258	1138	616	1025
Benzo[b]fluoranthene	5733	4457	ND	546	ND	ND	2769	1974	ND	N/A	N/A	1175	1194	612	1240
Benzo[g,h,i]perylene	871	685	ND	223	ND	ND	500	357	ND	N/A	N/A	761	836	407	862
Benzo[k]fluoranthene	2787	1850	ND	278	ND	ND	1353	856	ND	N/A	N/A	1028	854	446	838
Bis (2-ethylhexyl) phthalate	676	2885	ND	1044	ND	ND	886	1300	ND	373	N/A	N/A	N/A	N/A	N/A
Chrysene	2872	2253	ND	406	ND	ND	1463	1029	ND	N/A	1764	892	802	442	785
Fluoranthene	7853	6287	ND	741	ND	ND	3789	2758	ND	145	2900	131	796	797	1655
Fluorene	700	585	ND	126	ND	ND	372	314	ND	N/A	284	170.8	135	116	99
Indeno[1,2,3-cd]pyrene	875	685	ND	215	ND	ND	498	357	ND	N/A	N/A	1416	1190	625	1173
Phenanthrene	3139	2890	ND	185	ND	ND	1451	1302	ND	ND	1492	950	724	577	565
Pyrene	5194	6350	ND	700	ND	ND	2626	2785	ND	143	2428	1266	1067	762	1436
Metals (mg/kg)														
Arsenic	55	31	5	29	9	7	40	18	6	12.1	52.2	N/A	N/A	N/A	N/A
Cadmium	5	4	ND	3	2	1	4	2	1	0.39	6.02	0.37	0.62	0.11	6.88
Chromium	382	296	22	294	39	34	332	149	31	85.4	492	230.4	270	201	1103
Copper	178	115	9	139	15	14	155	58	12	58.2	24	79.7	102	64.8	210
Lead	856	251	10	164	22	20	460	120	17	46.7	420	125.1	224	63.2	225
Mercury	1	0	ND	0	0	0	1	0	0	0.27	0.79	0.41427	0.50	0.17	0.59
Nickel	37	27	11	N/A	N/A	N/A	N/A	N/A	N/A	32.3	N/A	71.5	57.5	45.7	64.3
Selenium	6	4	ND	4	2	1	5	3	1	0.56	1.83	N/A	N/A	N/A	N/A
Silver	2	2	ND	2	2	1	2	2	1	0.14	0.91	N/A	N/A	N/A	N/A
Zinc	1188	563	28	N/A	N/A	N/A	N/A	N/A	N/A	176	N/A	652.3	1072	324	1961

Footnotes:
(1) Average concentrations for AES 2006 and 2007 data are calculated using 1/2 the detection limit for nondetects. Average concentrations for historical data are calculated using zero for nondetects because detection limits were not available.
(2) Baltimore Harbor Anchorages and Channels, Maryland and Virginia. Integrated Feasibility Report and Environmental Impact Statement. U.S. Army Corps of Engineers, Baltimore District. March 1997.
(3) Registered Toxic Study. Chemical and Physical Analysis of Sediments from the Marine Channel and Associated Berths and Turning Basin. EA Engineering, Science, and Technology, Inc. February 1985.
(4) Registered Toxic Study. Spatial Mapping of Sedimentary Contaminants in the Baltimore Harbor/Patapsco River/ Back River System. Maryland Department of the Environment. August 1997.
(5) NOAA Screening Quick Reference Tables (SQUIRT), Buchman, 1999.

Notes:
ND = Nondetected result
N/A = Data Not Available

TABLE 2-4
COMPARISON OF AES SEDIMENT RESULTS NAD HISTORICAL INFORMATION TO SEDIMENT GUIDELINES
AES SPARROWS POINT, BALTIMORE, MD
PAGE 2 OF 2

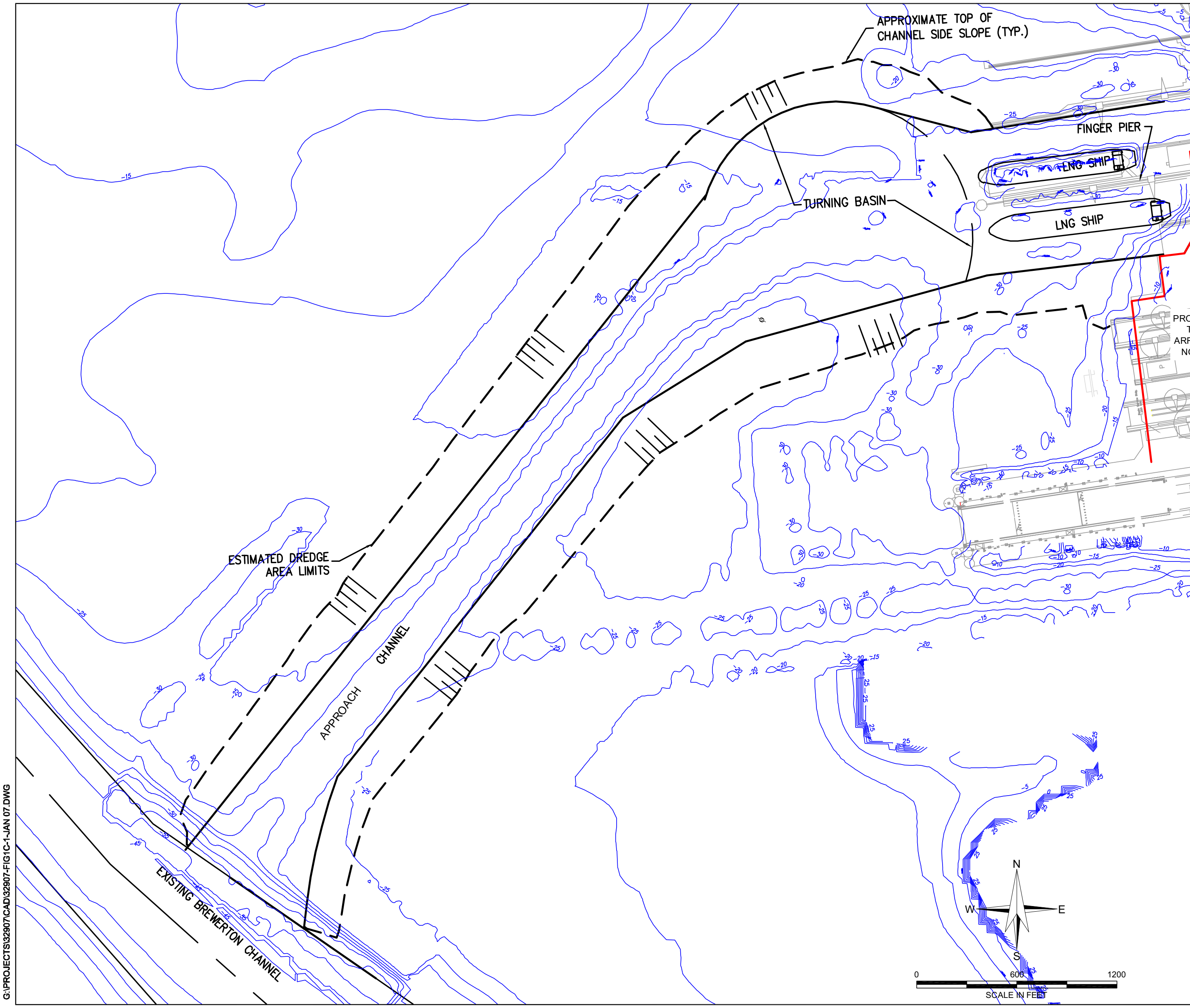
	RANGES OF POSITIVE DETECTIONS																								Marine Sediment Guidelines[5]		
Compounds	**AES Data (2006)**						**AES Data (2007)**						**AES Data (2006 & 2007)**						**Baltimore Harbor Anchorages & Channels (1997)[2]**		**Sparrows Point Marine Channel (1985)[3]**		**Baltimore Harbor/Patapsco River/Back River (1997)[4]**				
	ShallMin	**Shall Max**	**Inter Min**	**Inter Max**	**Deep Min**	**Deep Max**	**ShallMin**	**Shall Max**	**Inter Min**	**Inter Max**	**Deep Min**	**Deep Max**	**ShallMin**	**Shall Max**	**Inter Min**	**Inter Max**	**Deep Min**	**Deep Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**TEL**	**PEL**	**AET**
Semivolatile Organics (ug/kg)																											
2-Methylnaphthalene	870	3300	1300	1300	ND	ND	ND	ND	ND	ND	ND	ND	ND	3300	ND	ND	ND	ND	ND	ND	N/A	N/A	331.4	293.6	N/A	N/A	N/A
Acenaphthene	620	1700	780	780	ND	ND	ND	ND	ND	ND	ND	ND	ND	1700	ND	ND	ND	ND	N/A	N/A	1260	1260	102.3	113.6	6.71	88.9	130
Acenaphthylene	570	760	550	550	ND	ND	ND	ND	ND	ND	ND	ND	ND	760	ND	ND	ND	ND	N/A	N/A	450	450	101.6	75.3	5.87	127.87	71
Anthracene	520	3800	2000	2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	3800	ND	ND	ND	ND	ND	ND	500	1100	278.3	309.4	46.85	245	280
Benzo[a]anthracene	490	8800	500	6300	ND	ND	500	1400	ND	ND	ND	ND	490	8800	ND	ND	ND	ND	N/A	N/A	600	3100	610.6	875.9	74.83	692.53	960
Benzo[a]pyrene	620	8300	500	5800	ND	ND	1100	1900	ND	ND	ND	ND	620	8300	ND	ND	ND	ND	217	786	N/A	N/A	929.3	1410.9	88.81	763.22	1100
Benzo[b]fluoranthene	1200	15000	500	12000	ND	ND	760	2300	ND	ND	ND	ND	760	15000	ND	ND	ND	ND	N/A	N/A	N/A	N/A	982.1	1508.7	N/A	N/A	1800
Benzo[g,h,i]perylene	470	2700	1700	1700	ND	ND	1300	1300	ND	ND	ND	ND	470	2700	ND	ND	ND	ND	N/A	N/A	N/A	N/A	658	1114.7	N/A	N/A	670
Benzo[k]fluoranthene	660	7900	420	4900	ND	ND	650	900	ND	ND	ND	ND	650	7900	ND	ND	ND	ND	N/A	N/A	N/A	N/A	698.3	933	N/A	N/A	1800
Bis (2-ethylhexyl) phthalate	600	2900	8300	8300	ND	ND	270	6000	ND	ND	ND	ND	270	6000	ND	ND	ND	ND	177	1390	N/A	N/A	N/A	N/A	182.16	2646.51	1300
Chrysene	590	7900	530	6000	ND	ND	520	1700	ND	ND	ND	ND	520	7900	ND	ND	ND	ND	N/A	N/A	420	3500	632.6	964.8	107.77	845.98	950
Fluoranthene	980	22000	460	17000	ND	ND	1100	3400	ND	ND	ND	ND	980	22000	ND	ND	ND	ND	118	319	700	4800	971.2	1157.2	112.82	1493.54	1300
Fluorene	1300	2100	1400	1400	ND	ND	ND	ND	ND	ND	ND	ND	ND	2100	ND	ND	ND	ND	N/A	N/A	390	560	137.9	128.6	21.17	144.35	120
Indeno[1,2,3-cd]pyrene	480	2700	1700	1700	ND	ND	1200	1200	ND	ND	ND	ND	480	2700	ND	ND	ND	ND	N/A	N/A	N/A	N/A	766.2	1406.8	N/A	N/A	600
Phenanthrene	490	8700	640	7800	ND	ND	460	540	ND	ND	ND	ND	460	8700	ND	ND	ND	ND	ND	ND	960	2400	677	725.6	86.68	543.53	660
Pyrene	850	15000	820	18000	ND	ND	1100	3100	ND	ND	ND	ND	850	15000	ND	ND	ND	ND	194	369	640	4100	933.9	1136.5	152.66	1397.6	2400
Metals (mg/kg)																											
Arsenic	26	82	3.2	63	3.5	8.1	3.5	130	8	11	3.3	9.1	3.5	130	3.2	63	3.3	9.1	5.35	21.8	27	74	N/A	N/A	7.24	41.6	35
Cadmium	7.2	16	7.8	7.8	ND	ND	4.4	8.5	ND	ND	ND	ND	4.4	16	ND	7.8	ND	ND	1.55	1.6	1.8	12	0.44	0.6	0.676	4.21	3
Chromium	180	820	9.8	780	6.6	36	29	1300	37	43	21	79	29	1300	9.8	780	6.6	79	42.4	119	193	1110	270.4	285.2	52.3	160.4	62
Copper	100	320	7	290	9.3	13	16	630	14	17	7.3	18	16	630	7	290	7.3	18	23.4	140	15	36	85.7	94.2	18.7	108.2	390
Lead	210	3900	84	520	3.7	18	17	600	20	25	11	24	17	3900	20	520	3.7	24	10.4	106	183	804	260.4	265.9	30.24	112.18	400
Mercury	0.43	3.5	0.16	0.93	ND	ND	0.6	1.3	ND	ND	ND	ND	0.43	3.5	ND	0.93	ND	ND	0.12	0.85	0.36	1.36	0.56223	0.32	0.13	0.696	0.41
Nickel	24	58	2.9	51	1.9	23	N/A	N/A	N/A	N/A	N/A	N/A	24	58	2.9	51	1.9	23	19.3	37.7	N/A	N/A	61	49.6	15.9	42.8	110
Selenium	4.2	11	8.6	8.6	ND	ND	4.8	20	ND	ND	ND	ND	4.2	20	8.6	8.6	ND	ND	1.11	3.34	0.7	6.14	N/A	N/A	N/A	N/A	1
Silver	5.7	5.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.7	ND	ND	ND	ND	0.57	0.59	0.6	1.16	N/A	N/A	0.73	1.77	3.1
Zinc	520	3100	110	1400	5.7	58	N/A	N/A	N/A	N/A	N/A	N/A	520	3100	110	1400	5.7	58	60.9	238	N/A	N/A	1016.7	1204.1	124	271	410

Footnotes:
(1) Average concentrations for AES 2006 and 2007 data are calculated using 1/2 the detection limit for nondetects. Average concentrations for historical data are calculated using zero for nondetects because detection limits were not available.
(2) Baltimore Harbor Anchorages and Channels, Maryland and Virginia. Integrated Feasibility Report and Environmental Impact Statement. U.S. Army Corps of Engineers, Baltimore District. March 1997.
(3) Registered Toxic Study. Chemical and Physical Analysis of Sediments from the Marine Channel and Associated Berths and Turning Basin. EA Engineering, Science, and Technology, Inc. February 1985.
(4) Registered Toxic Study. Spatial Mapping of Sedimentary Contaminants in the Baltimore Harbor/Patapsco River/Back River System. Maryland Department of the Environment. August 1997.
(5) NOAA Screening Quick Reference Tables (SQUIRT), Buchman, 1999.

Notes:
ND = Nondetected result
N/A = Data Not Available

Table 3-1
AES Sparrows Point LNG, LLC & Mid-Atlantic Express, LLC
DDREDGE AND RECLAIMATION PROJECT SCHEDULE

		2009												2010												2011											
	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	NTP = 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Phase	**Description**																																				
Construction																																					
	Notice To Proceed	NTP																																			
	LNG Terminal Summary																																				
	Detailed Engineering																																				
	Site Work																																				
	Terminal Construction																																				
	Comissioning																																				
	Commercial Operation																																				
	Marine Terminal Summary																																				
	Detailed Engineering																																				
	Pier Construction																																				
	Sheet Pile Bulkhead																																				
	Facility Ready to Recevie Ships																																				
	First Ship Arrives																																				
	Dredge and Reclamation Summary																																				
	Dredge																																				
	Mobilize																																				
	Dredge																																				
	Demobilize																																				
	Reclamation																																				
	Mobilize																																				
	Process Dredge Material																																				
	Stockpile & Remove Material																																				
	Demobilize Processing Equipment																																				



NOTES:

1. A) PLAN IS ADAPTED FROM A PHASE II PLAN PREPARED BY GZA GEOENVIRONMENTAL, INC. OF VERNON, CT, TITLED "EXPLORATION LOCATION PLAN", DATED 4/12/04. NOTE THAT A STANDARD COORDINATE SYSTEM WAS NOT USED FOR THE ELECTRONIC FILE, AND B) PLAN IS ADAPTED FROM A PLAN PREPARED BY CAREBA POWER ENGINEERS, LLC OF NEEDHAM, MA, TITLED "GENERAL ARRANGEMENT PLAN", DATED 02-02-06. NOTE THAT A STANDARD COORDINATE SYSTEM WAS NOT USED FOR THE ELECTRONIC FILE.
2. BATHYMETRY BASED ON TRANSECTS SURVEYED IN APRIL 2004 AND FEBRUARY 2006 BY WATERWAY SURVEYS & ENGINEERING, LTD. OF VIRGINIA BEACH, VIRGINIA.
3. DREDGING LIMITS ARE APPROXIMATE ONLY.

AES SPARROWS POINT LNG, LLC
BALTIMORE COUNTY, MD-CHESTER COUNTY, PA

PROPOSED LNG TERMINAL
APPROACH CHANNEL
EXISTING BATHYMETRY

PREPARED BY:
HALEY & ALDRICH

SCALE: AS SHOWN
JANUARY 2007

FIGURE 1-1

APPENDIX D

Consolidated Dredge Plan

Part 2

Attachment D43

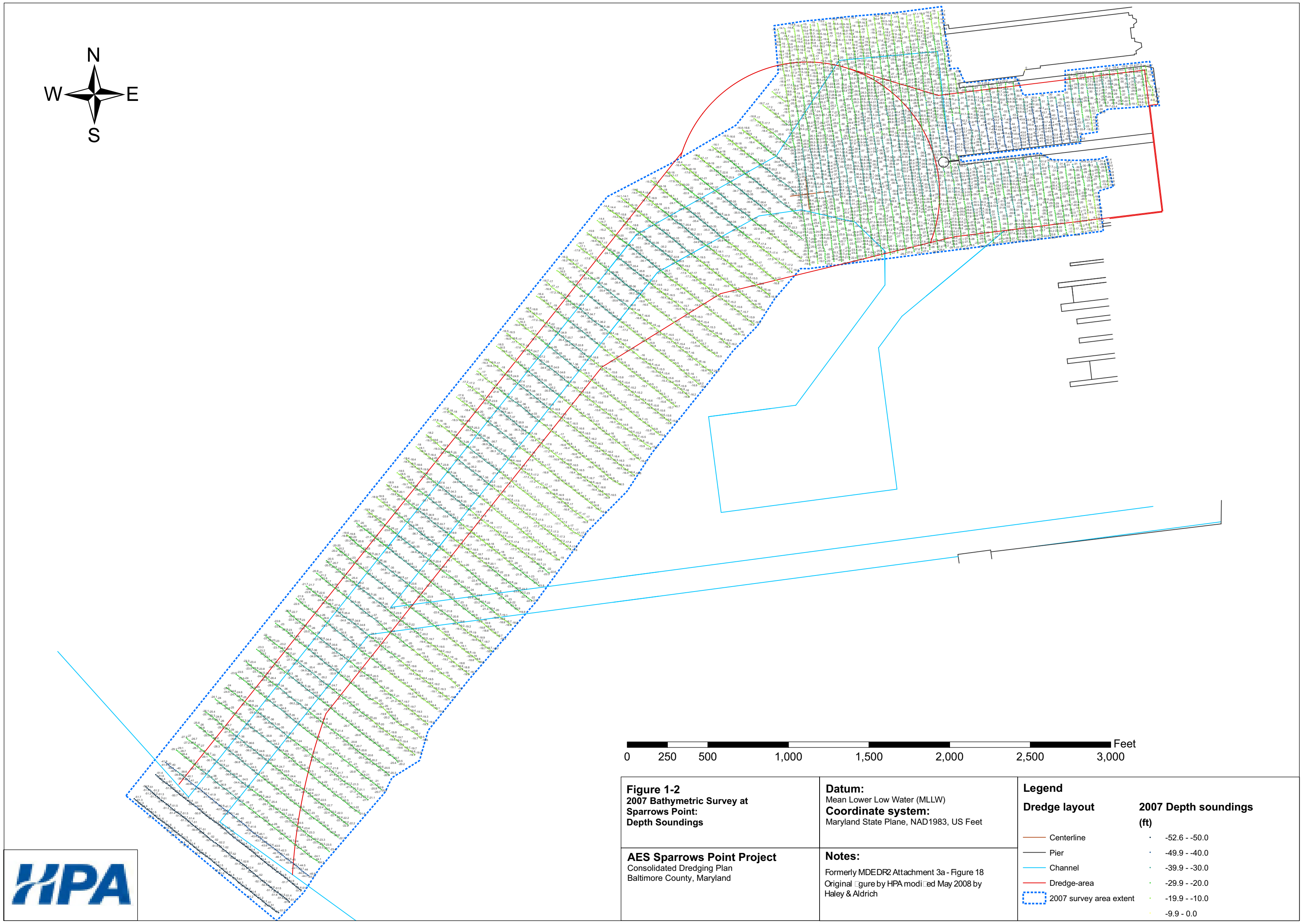


Figure 1-2
2007 Bathymetric Survey at Sparrows Point: Depth Soundings

AES Sparrows Point Project
Consolidated Dredging Plan
Baltimore County, Maryland

Datum:
Mean Lower Low Water (MLLW)
Coordinate system:
Maryland State Plane, NAD1983, US Feet

Notes:
Formerly MDE DR2 Attachment 3a - Figure 18
Original figure by HPA modified May 2008 by Haley & Aldrich

Legend

Dredge layout	**2007 Depth soundings (ft)**
Centerline	-52.6 - -50.0
Pier	-49.9 - -40.0
Channel	-39.9 - -30.0
Dredge-area	-29.9 - -20.0
2007 survey area extent	-19.9 - -10.0
	-9.9 - 0.0

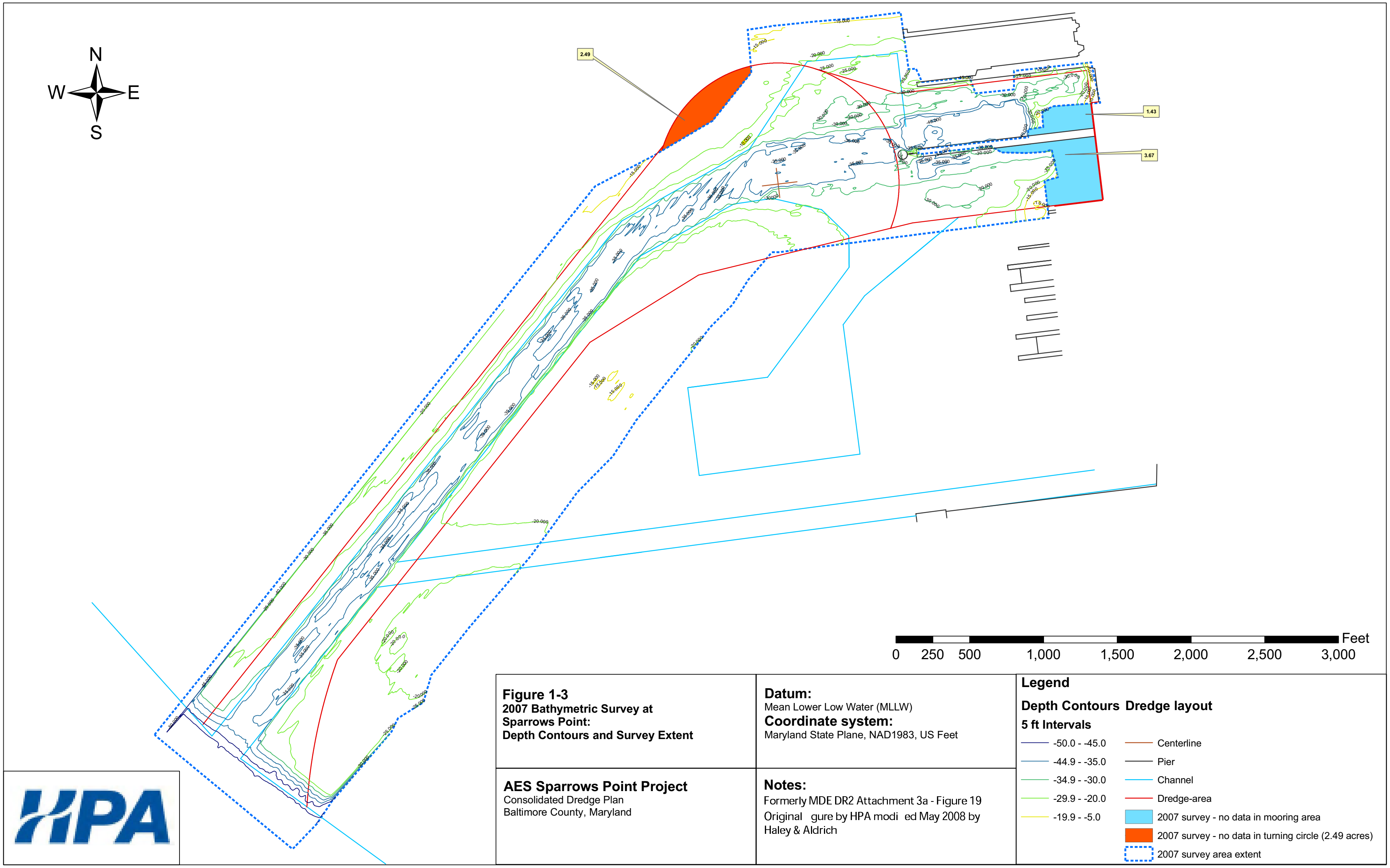


Figure 1-3
2007 Bathymetric Survey at Sparrows Point: Depth Contours and Survey Extent

Datum:
Mean Lower Low Water (MLLW)

Coordinate system:
Maryland State Plane, NAD1983, US Feet

AES Sparrows Point Project
Consolidated Dredge Plan
Baltimore County, Maryland

Notes:
Formerly MDE DR2 Attachment 3a - Figure 19
Original gure by HPA modi ed May 2008 by Haley & Aldrich

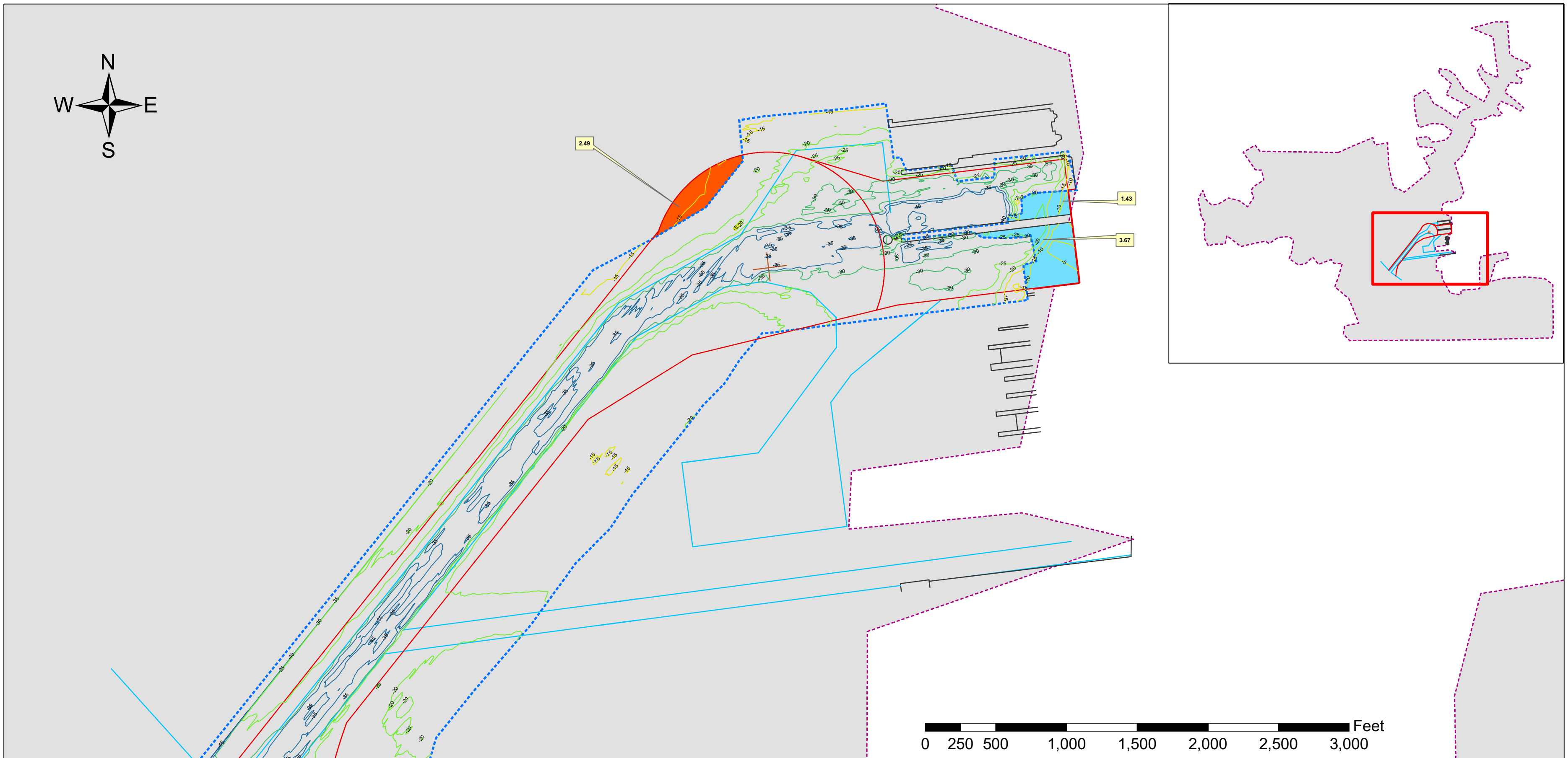


Figure 1-4
2007 Bathymetric Survey at Sparrows Point: Depth Contours and Survey Extent of GEODAS data

Datum:
Mean Lower Low Water (MLLW)
Coordinate system:
Maryland State Plane, NAD1983, US Feet

Legend

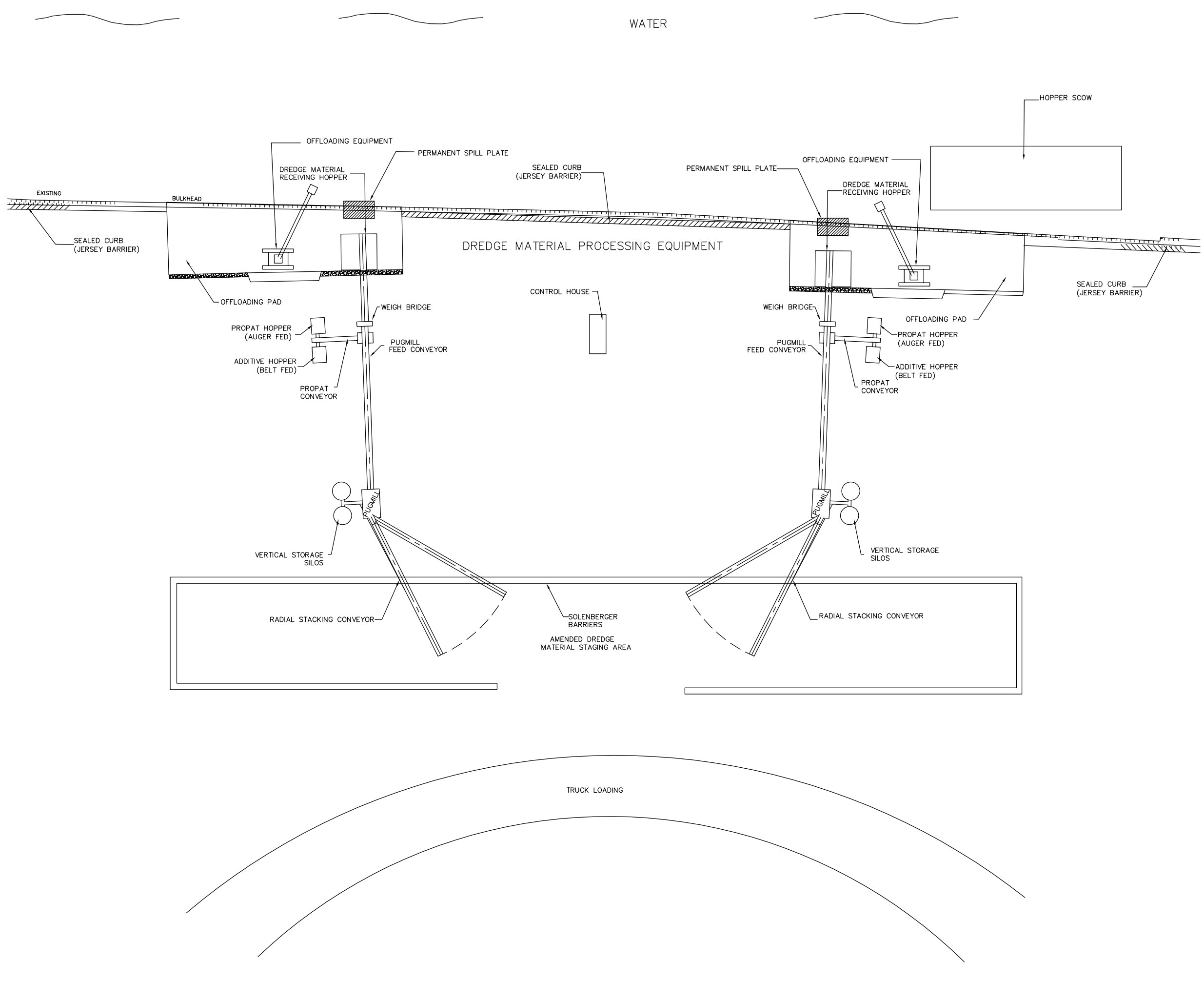
Depth Contours
5 ft Intervals
- -50.0 - -45.0
- -44.9 - -35.0
- -34.9 - -30.0
- -29.9 - -20.0
- -19.9 - -5.0
- 2007 survey - no data in mooring area
- 2007 survey - no data in turning circle

Dredge Layout
- Centerline
- Pier
- Channel
- Dredge-area
- GEODAS survey extent
- 2007 survey area extent

HPA

AES Sparows Point Project
Consolidated Dredging Plan
Baltimore County, Maryland

Notes:
Contours from Geodas data are presented in areas where the 2007 survey does not cover
Formerly MDE DR2 Attachment 3a - Figure 20
Original figure by HPA modified May 2008 by Haley & Aldrich



TYPICAL DREDGE RECYCLE OPERATION LAYOUT

NOTE:
THIS DRAWING IS INTENDED TO DEPICT THE TYPICAL ELEMENTS FOR TWO DREDGE MATERIAL RECYCLING OPERATIONS WORKING IN "PARALLEL." THE ACTUAL CONFIGURATION WILL VARY IN ACCORDANCE WITH AVAILABLE SPACE AND SITE CONSTRAINTS, AS SHOWN IN FIGURE 1C-3.

FORMERLY MDE DR2 - FIGURE 1C-2

ORIGINAL FIGURE BY ERG MODIFIED MAY 2008 BY HALEY & ALDRICH

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)

DRAWN BY: JMW	CHECKED BY: TGP	FIGURE 1-5 DREDGE MATERIAL RECYCLING FACILITY PLAN – TYPICAL	PREPARED BY: ENVIRONMENTAL ENGINEERING and SCIENCE; ERG; EARTHRES GROUP; EarthRes Group, Inc. P.O.Box 468 7137 Old Easton Road Pipersville, PA 18947 USA www.earthres.com 215–766–1211	PREPARED FOR: CLEAN EARTH DREDGING TECHNOLOGIES, INC. 334 SOUTH WARMINSTER ROAD HATBORO, PENNSYLVANIA 19040
DATE: 04/26/06	PROJECT NO: 981004.003			
DRAWING NUMBER: E–015		AES Sparrows Point Project Consolidated Dredging Plan		

NO.	DATE	BY	REVISIONS
1			

General Notes

FORMERLY MDE DR2 FIGURE 1C-3

ORIGINAL FIGURE BY CLEAN EARTH DREDGING TECHNOLOGIES MODIFIED MAY 2008 BY HALEY & ALDRICH

No.	Revision/Issue	Date

Firm Name and Address

CLEANEARTH Dredging Technologies

Hatboro, PA 19040
215-734-1400

FIGURE 1-6

DREDGE MATERIAL RECYCLING FACILITY PLAN

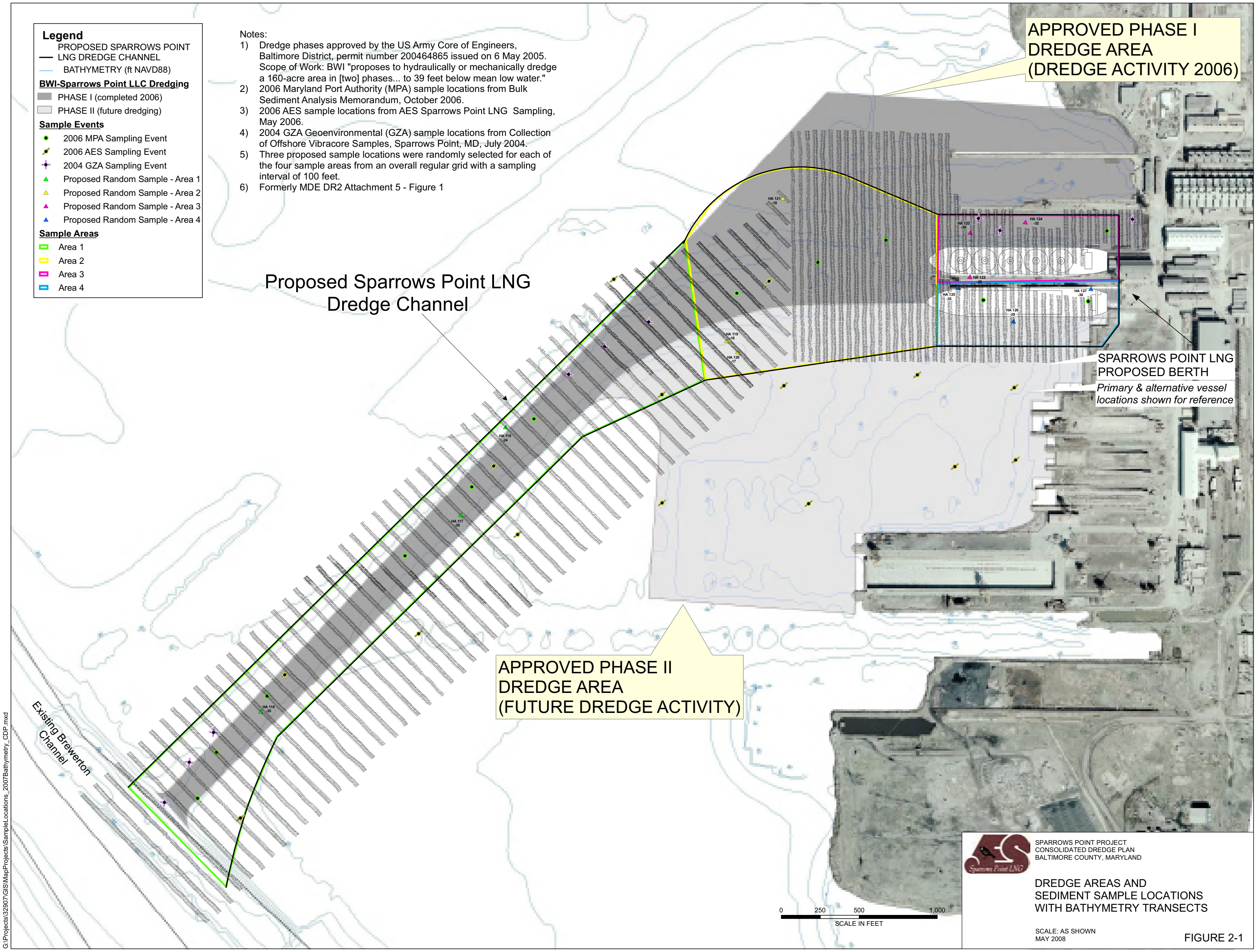
Project Name and Address

AES SPARROWS POINT PROJECT
CONSOLIDATED DREDGING PLAN
BALTIMORE COUNTY, MARYLAND

Project | Sheet

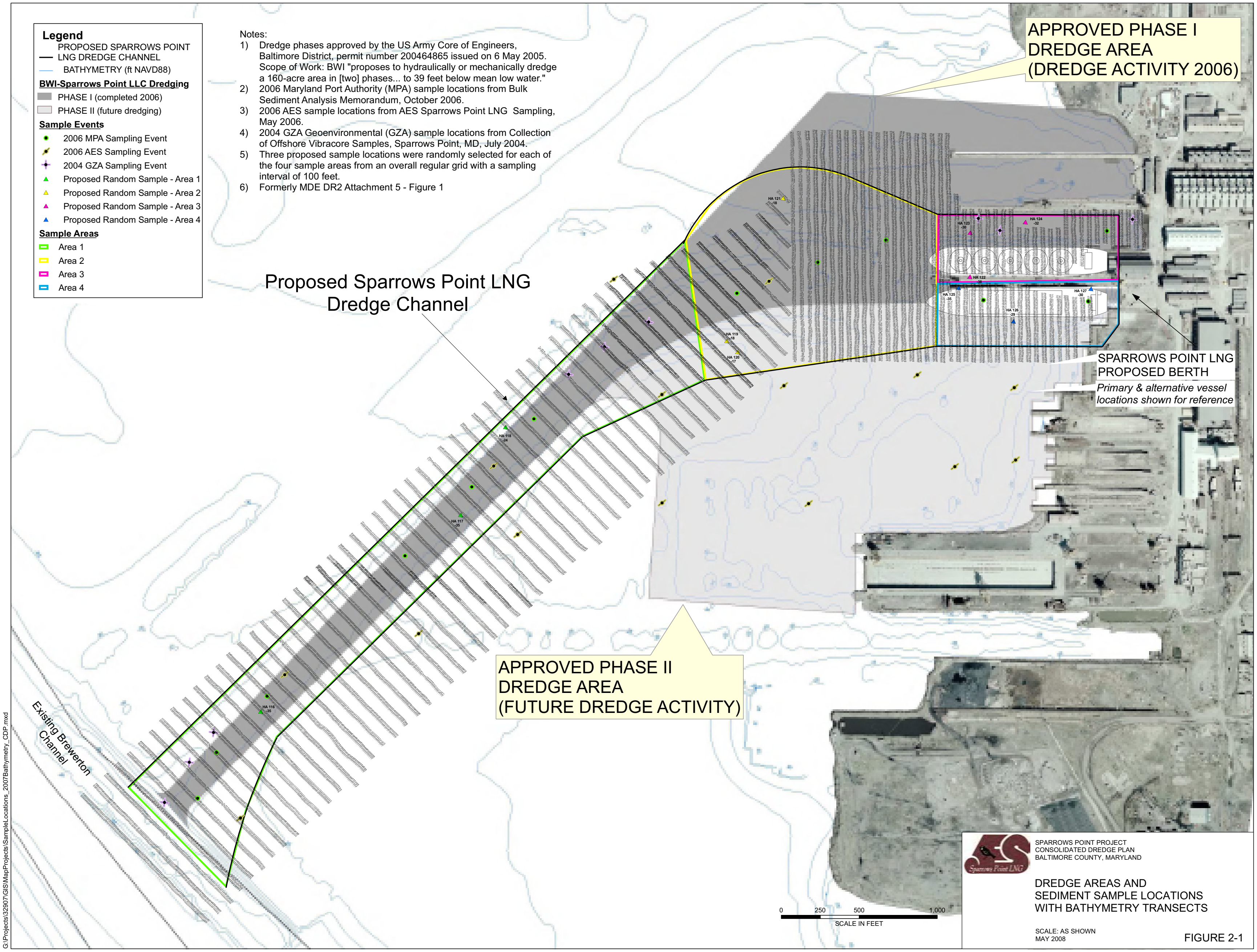
Date 8-7-06

Scale



G:\Projects\32907\GIS\MapProjects\SampleLocations_2007Bathymetry_CDP.mxd

Attachment D43



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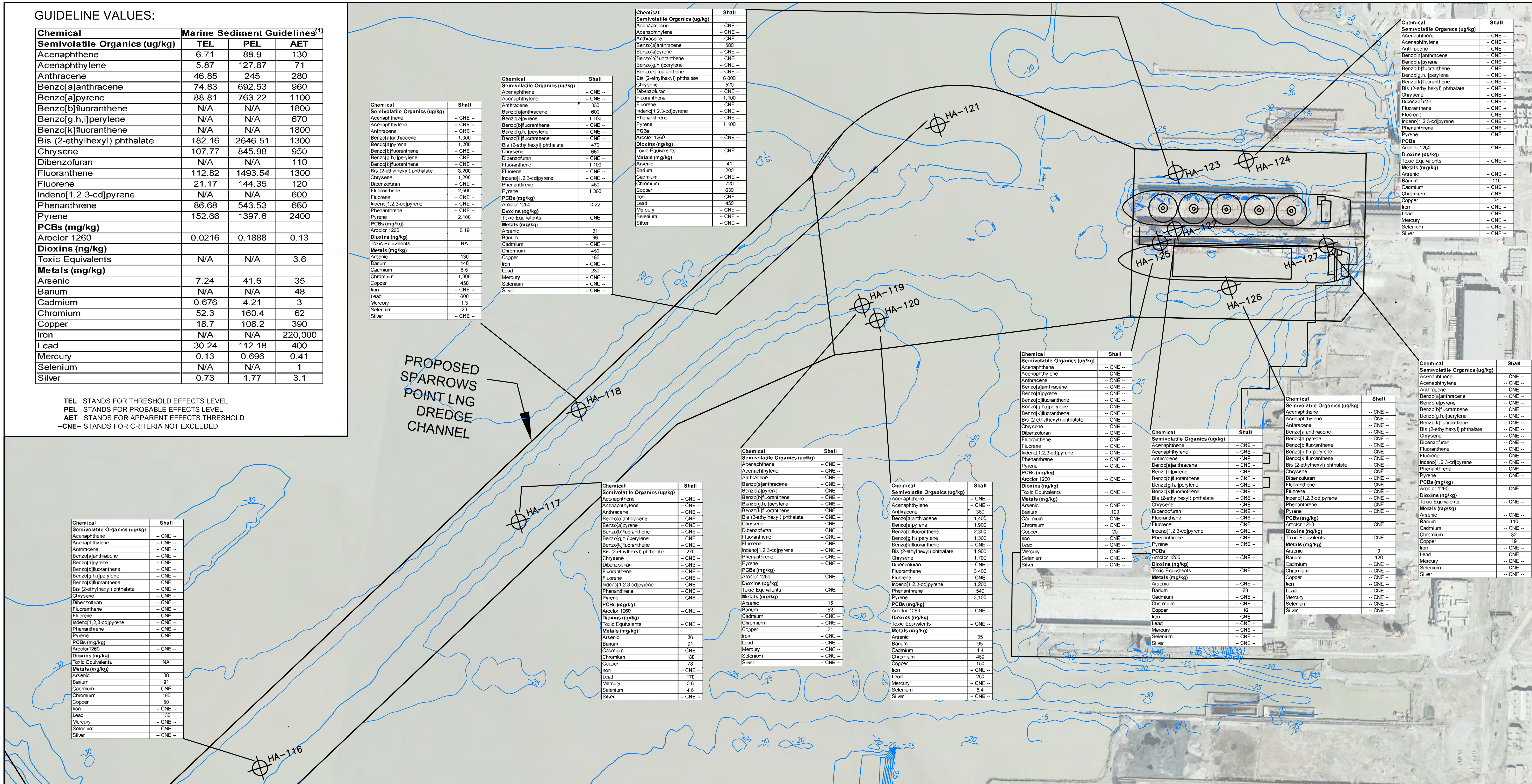
Attachment D43

Attachment D43

GUIDELINE VALUES:

Chemical	Marine Sediment Guidelines[1]		
Semivolatile Organics (ug/kg)	**TEL**	**PEL**	**AET**
Acenaphthene	6.71	88.9	130
Acenaphthylene	5.87	127.87	71
Anthracene	46.85	245	280
Benzo[a]anthracene	74.83	692.53	960
Benzo[a]pyrene	88.81	763.22	1100
Benzo[b]fluoranthene	N/A	N/A	1800
Benzo[g,h,i]perylene	N/A	N/A	670
Benzo[k]fluoranthene	N/A	N/A	1800
Bis (2-ethylhexyl) phthalate	182.16	2646.51	1300
Chrysene	107.77	845.98	950
Dibenzofuran	N/A	N/A	110
Fluoranthene	112.82	1493.54	1300
Fluorene	21.17	144.35	120
Indeno[1,2,3-cd]pyrene	N/A	N/A	600
Phenanthrene	86.68	543.53	660
Pyrene	152.66	1397.6	2400
PCBs (mg/kg)			
Aroclor 1260	0.0216	0.1888	0.13
Dioxins (ng/kg)			
Toxic Equivalents	N/A	N/A	3.6
Metals (mg/kg)			
Arsenic	7.24	41.6	35
Barium	N/A	N/A	48
Cadmium	0.676	4.21	3
Chromium	52.3	160.4	62
Copper	18.7	108.2	390
Iron	N/A	N/A	220,000
Lead	30.24	112.18	400
Mercury	0.13	0.696	0.41
Selenium	N/A	N/A	1
Silver	0.73	1.77	3.1

TEL STANDS FOR THRESHOLD EFFECTS LEVEL
PEL STANDS FOR PROBABLE EFFECTS LEVEL
AET STANDS FOR APPARENT EFFECTS THRESHOLD
--CNE-- STANDS FOR CRITERIA NOT EXCEEDED



NOTES:

1. THE RESULTS LISTED FOR EACH BORING LOCATION SHOW ONLY THOSE RESULTS FOR COMPOUNDS DETECTED ABOVE THE METHOD QUANTITATION LIMIT THAT ALSO EXCEED THE LOWEST COMPARISON CRITERIA FOR THE COMPOUNDS DETECTED (IE. IF A COMPOUND WAS DETECTED, BUT NOT SHOWN, IT IS BECAUSE IT DOES NOT EXCEED ITS COMPARISON CRITERION). A COMPLETE LISTING OF SAMPLING RESULTS IS PRESENTED IN TABLE 1.
2. MARINE SEDIMENT GUIDELINES FROM NOAA SCREENING QUICK REFERENCE TABLES (SQUIRT), BUCHMAN 1999.
3. SHALLOW REFERS TO 0.0-2.0 FEET BELOW SEDIMENT SURFACE.
4. COORDINATE SYSTEM IS IN FEET AND REFERS TO MARYLAND STATE GRID, BASED ON NAD83.
5. THE BATHYMETRY SURVEY WAS PERFORMED BY WATERWAY SURVEYS & ENGINEERING, LTD. OF VIRGINIA BEACH, VIRGINIA DURING THE PERIOD APRIL 2004 AND FEBRUARY 2006. THE SOUNDINGS ARE IN FEET AND REFER TO THE MEAN LOWER LOW WATER (MLLW) BASED ON N.O.S. RECORDING TIDE GAGE AT FORT McHENRY. (USC&G MLLW + 0.84 FT = NAVD88)
6. FOMERLY MDE DR2 FIGURE 2A.

LEGEND

HA-101 — LOCATION AND DESIGNATION OF WATER-BASED VIBRACORES (HA-116 THROUGH HA-127) DRILLED BY ALPINE OCEAN SEISMIC SURVEY, INC. OF NORWOOD, NEW JERSEY DURING THE PERIOD 21 THROUGH 24 AUGUST 2007.

N / E / S / W

0 500 1000
SCALE IN FEET

AES SPARROWS POINT PROJECT
CONSOLIDATED DREDGING PLAN
BALTIMORE COUNTY, MARYLAND

AUGUST 2007 SHALLOW VIBRACORE AND SEDIMENT SAMPLES NOAA SCREENING CONCENTRATIONS

PREPARED BY:
HALEY & ALDRICH

SCALE: AS SHOWN
MAY 2008

FIGURE 2-2

32907-001 E01

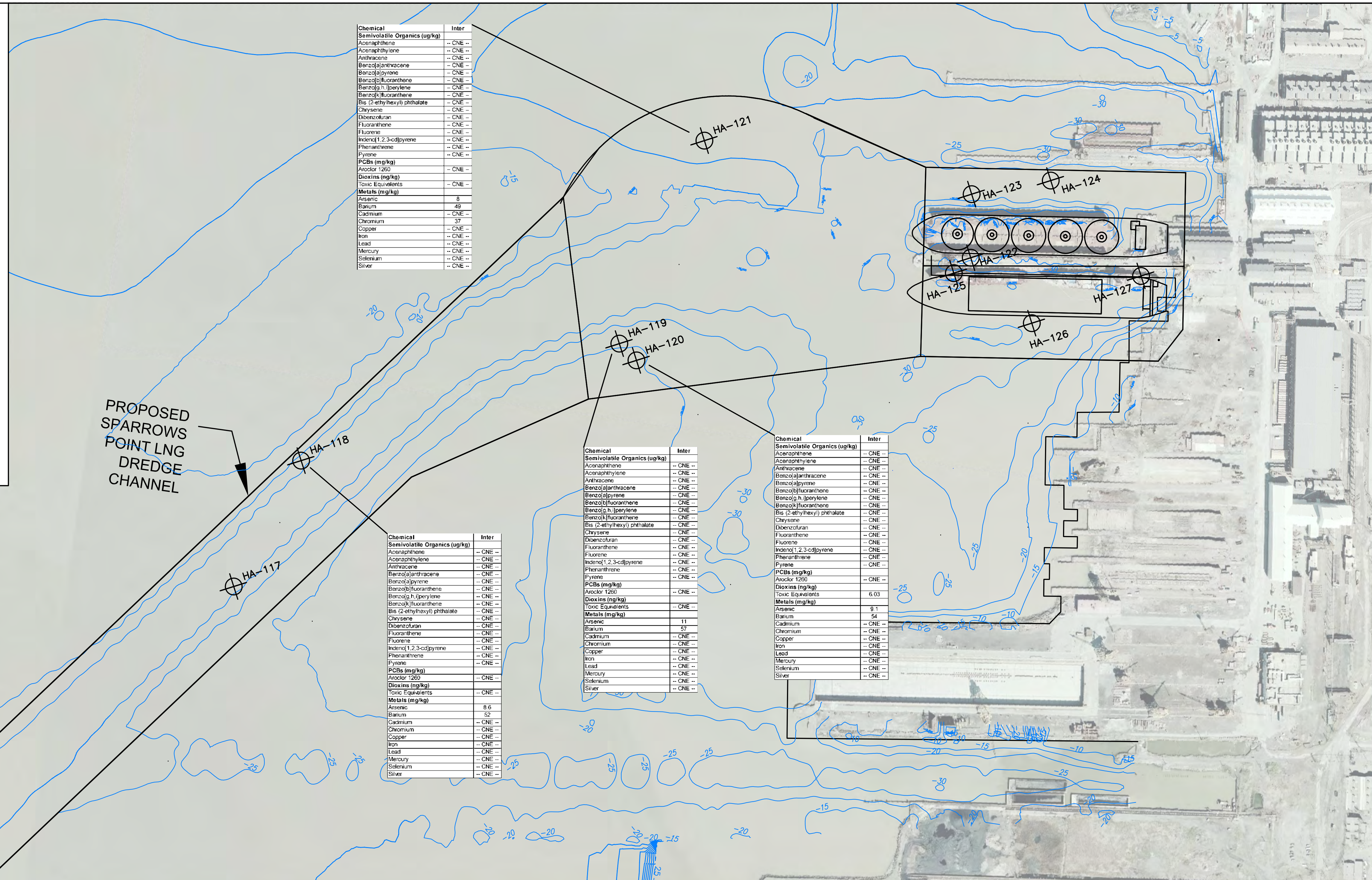
G:\PROJECTS\32907\CAD\BORING LOC PLAN WITH SED EXC DRAWINGS\2007 0921_SAMPLE RESULTS_CDP.DWG

Attachment D43

GUIDELINE VALUES:

Chemical	Marine Sediment Guidelines[1]		
Semivolatile Organics (ug/kg)	**TEL**	**PEL**	**AET**
Acenaphthene	6.71	88.9	130
Acenaphthylene	5.87	127.87	71
Anthracene	46.85	245	280
Benzo[a]anthracene	74.83	692.53	960
Benzo[a]pyrene	88.81	763.22	1100
Benzo[b]fluoranthene	N/A	N/A	1800
Benzo[g,h,i]perylene	N/A	N/A	670
Benzo[k]fluoranthene	N/A	N/A	1800
Bis (2-ethylhexyl) phthalate	182.16	2646.51	1300
Chrysene	107.77	845.98	950
Dibenzofuran	N/A	N/A	110
Fluoranthene	112.82	1493.54	1300
Fluorene	21.17	144.35	120
Indeno[1,2,3-cd]pyrene	N/A	N/A	600
Phenanthrene	86.68	543.53	660
Pyrene	152.66	1397.6	2400
PCBs (mg/kg)			
Aroclor 1260	0.0216	0.1888	0.13
Dioxins (ng/kg)			
Toxic Equivalents	N/A	N/A	3.6
Metals (mg/kg)			
Arsenic	7.24	41.6	35
Barium	N/A	N/A	48
Cadmium	0.676	4.21	3
Chromium	52.3	160.4	62
Copper	18.7	108.2	390
Iron	N/A	N/A	220,000
Lead	30.24	112.18	400
Mercury	0.13	0.696	0.41
Selenium	N/A	N/A	1
Silver	0.73	1.77	3.1

TEL STANDS FOR THRESHOLD EFFECTS LEVEL
PEL STANDS FOR PROBABLE EFFECTS LEVEL
AET STANDS FOR APPARENT EFFECTS THRESHOLD
--CNE-- STANDS FOR CRITERIA NOT EXCEEDED



Chemical	Inter
Semivolatile Organics (ug/kg)	
Acenaphthene	-- CNE --
Acenaphthylene	-- CNE --
Anthracene	-- CNE --
Benzo[a]anthracene	– CNE –
Benzo[a]pyrene	– CNE –
Benzo[b]fluoranthene	– CNE –
Benzo[g,h,i]perylene	– CNE –
Benzo[k]fluoranthene	– CNE –
Bis (2-ethylhexyl) phthalate	– CNE –
Chrysene	– CNE –
Dibenzofuran	– CNE –
Fluoranthene	– CNE –
Fluorene	– CNE –
Indeno[1,2,3-cd]pyrene	-- CNE --
Phenanthrene	-- CNE --
Pyrene	-- CNE --
PCBs (mg/kg)	
Aroclor 1260	– CNE –
Dioxins (ng/kg)	
Toxic Equivalents	– CNE –
Metals (mg/kg)	
Arsenic	8
Barium	49
Cadmium	– CNE –
Chromium	37
Copper	– CNE –
Iron	-- CNE --
Lead	-- CNE --
Mercury	-- CNE --
Selenium	-- CNE --
Silver	-- CNE --

Chemical	Inter
Semivolatile Organics (ug/kg)	
Acenaphthene	-- CNE --
Acenaphthylene	-- CNE --
Anthracene	-- CNE --
Benzo[a]anthracene	-- CNE --
Benzo[a]pyrene	-- CNE --
Benzo[b]fluoranthene	-- CNE --
Benzo[g,h,i]perylene	-- CNE --
Benzo[k]fluoranthene	-- CNE --
Bis (2-ethylhexyl) phthalate	-- CNE --
Chrysene	-- CNE --
Dibenzofuran	-- CNE --
Fluoranthene	-- CNE --
Fluorene	-- CNE --
Indeno[1,2,3-cd]pyrene	-- CNE --
Phenanthrene	-- CNE --
Pyrene	-- CNE --
PCBs (mg/kg)	
Aroclor 1260	-- CNE --
Dioxins (ng/kg)	
Toxic Equivalents	-- CNE --
Metals (mg/kg)	
Arsenic	8.6
Barium	52
Cadmium	-- CNE --
Chromium	-- CNE --
Copper	-- CNE --
Iron	-- CNE --
Lead	-- CNE --
Mercury	-- CNE --
Selenium	-- CNE --
Silver	-- CNE --

Chemical	Inter
Semivolatile Organics (ug/kg)	
Acenaphthene	-- CNE --
Acenaphthylene	-- CNE --
Anthracene	-- CNE --
Benzo[a]anthracene	-- CNE --
Benzo[a]pyrene	-- CNE --
Benzo[b]fluoranthene	-- CNE --
Benzo[g,h,i]perylene	-- CNE --
Benzo[k]fluoranthene	-- CNE --
Bis (2-ethylhexyl) phthalate	-- CNE --
Chrysene	-- CNE --
Dibenzofuran	-- CNE --
Fluoranthene	-- CNE --
Fluorene	-- CNE --
Indeno[1,2,3-cd]pyrene	-- CNE --
Phenanthrene	-- CNE --
Pyrene	-- CNE --
PCBs (mg/kg)	
Aroclor 1260	-- CNE --
Dioxins (ng/kg)	
Toxic Equivalents	-- CNE --
Metals (mg/kg)	
Arsenic	11
Barium	57
Cadmium	-- CNE --
Chromium	-- CNE --
Copper	-- CNE --
Iron	-- CNE --
Lead	-- CNE --
Mercury	-- CNE --
Selenium	-- CNE --
Silver	-- CNE --

Chemical	Inter
Semivolatile Organics (ug/kg)	
Acenaphthene	-- CNE --
Acenaphthylene	-- CNE --
Anthracene	-- CNE --
Benzo[a]anthracene	-- CNE --
Benzo[a]pyrene	-- CNE --
Benzo[b]fluoranthene	-- CNE --
Benzo[g,h,i]perylene	-- CNE --
Benzo[k]fluoranthene	-- CNE --
Bis (2-ethylhexyl) phthalate	-- CNE --
Chrysene	-- CNE --
Dibenzofuran	-- CNE --
Fluoranthene	-- CNE --
Fluorene	-- CNE --
Indeno[1,2,3-cd]pyrene	-- CNE --
Phenanthrene	-- CNE --
Pyrene	-- CNE --
PCBs (mg/kg)	
Aroclor 1260	-- CNE --
Dioxins (ng/kg)	
Toxic Equivalents	6.03
Metals (mg/kg)	
Arsenic	9.1
Barium	54
Cadmium	-- CNE --
Chromium	-- CNE --
Copper	-- CNE --
Iron	-- CNE --
Lead	-- CNE --
Mercury	-- CNE --
Selenium	-- CNE --
Silver	-- CNE --

NOTES:

1. THE RESULTS LISTED FOR EACH BORING LOCATION SHOW ONLY THOSE RESULTS FOR COMPOUNDS DETECTED ABOVE THE METHOD QUANTITATION LIMIT THAT ALSO EXCEED THE LOWEST COMPARISON CRITERIA FOR THE COMPOUNDS DETECTED (IE. IF A COMPOUND WAS DETECTED, BUT NOT SHOWN, IT IS BECAUSE IT DOES NOT EXCEED ITS COMPARISON CRITERION). A COMPLETE LISTING OF SAMPLING RESULTS IS PRESENTED IN TABLE 1.
2. MARINE SEDIMENT GUIDELINES FROM NOAA SCREENING QUICK REFERENCE TABLES (SQUIRT), BUCHMAN 1999.
3. SHALLOW REFERS TO 0.0-2.0 FEET BELOW SEDIMENT SURFACE.
4. COORDINATE SYSTEM IS IN FEET AND REFERS TO MARYLAND STATE GRID, BASED ON NAD83.
5. THE BATHYMETRY SURVEY WAS PERFORMED BY WATERWAY SURVEYS & ENGINEERING, LTD. OF VIRGINIA BEACH, VIRGINIA DURING THE PERIOD APRIL 2004 AND FEBRUARY 2006. THE SOUNDINGS ARE IN FEET AND REFER TO THE MEAN LOWER LOW WATER (MLLW) BASED ON N.O.S. RECORDING TIDE GAGE AT FORT McHENRY. (USC&G MLLW + 0.84 FT = NAVD88)
6. FORMERLY MDE DR2 FIGURE 2B.

LEGEND

HA–101 LOCATION AND DESIGNATION OF WATER-BASED VIBRACORES (HA-116 THROUGH HA-127) DRILLED BY ALPINE OCEAN SEISMIC SURVEY, INC. OF NORWOOD, NEW JERSEY DURING THE PERIOD 21 THROUGH 24 AUGUST 2007.

N E S W

0 500 1000
SCALE IN FEET

Sparrows Point LNG

AES SPARROWS POINT PROJECT
CONSOLIDATED DREDGING PLAN
BALTIMORE COUNTY, MARYLAND

AUGUST 2007 INTERMEDIATE VIBRACORE AND SEDIMENT SAMPLES NOAA SCREENING CONCENTRATIONS

PREPARED BY:
HALEY & ALDRICH

SCALE: AS SHOWN
MAY 2008

FIGURE 2-3

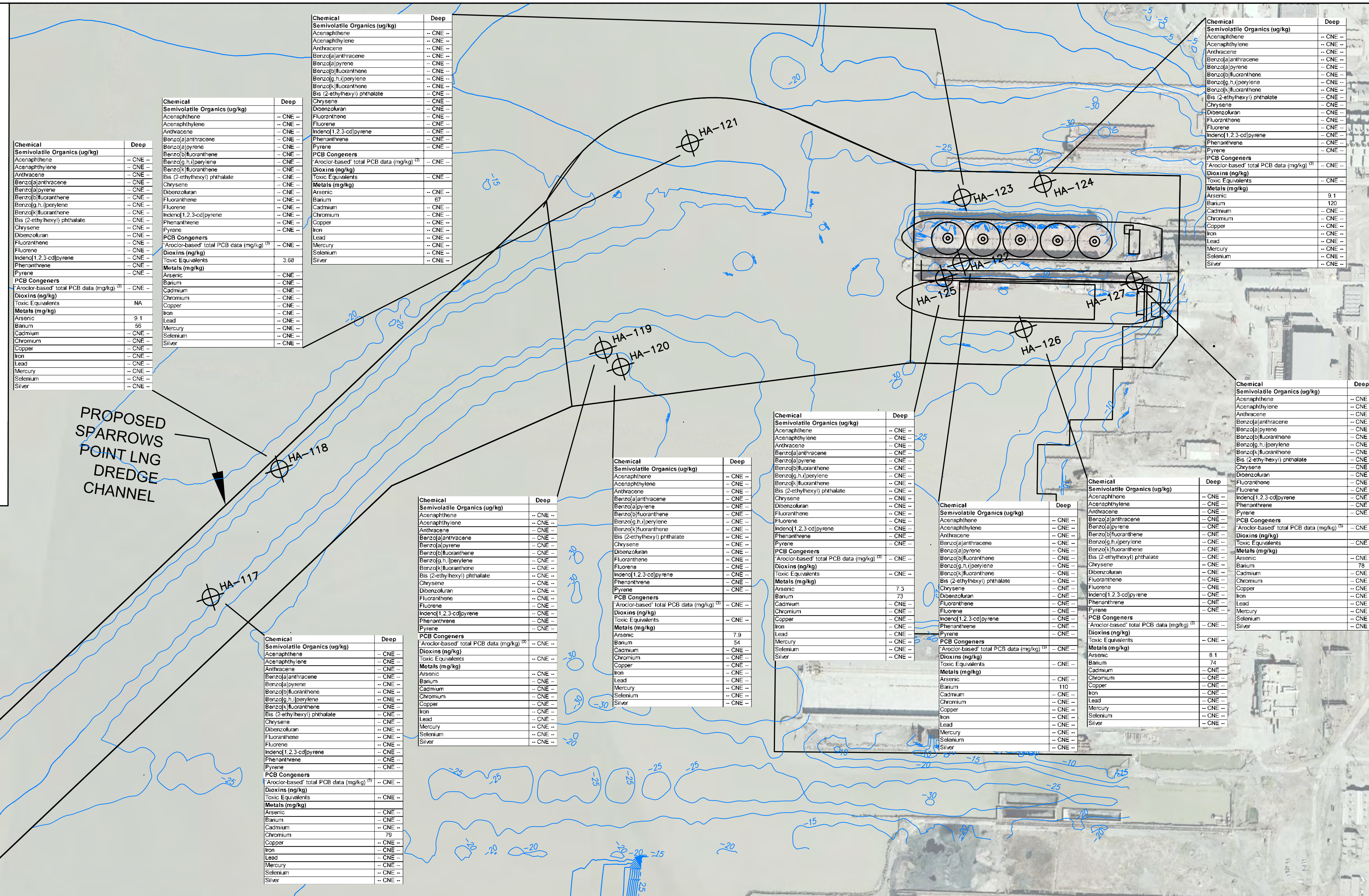
G:\PROJECTS\32907\CAD\BORING LOC PLAN WITH SED EXC DRAWINGS\2007 0921_SAMPLE RESULTS_CDP.DWG

32907–001 E01

GUIDELINE VALUES:

Chemical	Marine Sediment Guidelines[1]		
Semivolatile Organics (ug/kg)	TEL	PEL	AET
Acenaphthene	6.71	88.9	130
Acenaphthylene	5.87	127.87	71
Anthracene	46.85	245	280
Benzo[a]anthracene	74.83	692.53	960
Benzo[a]pyrene	88.81	763.22	1100
Benzo[b]fluoranthene	N/A	N/A	1800
Benzo[g,h,i]perylene	N/A	N/A	670
Benzo[k]fluoranthene	N/A	N/A	1800
Bis (2-ethylhexyl) phthalate	182.16	2646.51	1300
Chrysene	107.77	845.98	950
Dibenzofuran	N/A	N/A	110
Fluoranthene	112.82	1493.54	1300
Fluorene	21.17	144.35	120
Indeno[1,2,3-cd]pyrene	N/A	N/A	600
Phenanthrene	86.68	543.53	660
Pyrene	152.66	1397.6	2400
PCB Congeners			
"Aroclor-based" total PCB data (mg/kg) [3]	N/A	N/A	N/A
Dioxins (ng/kg)			
Toxic Equivalents	N/A	N/A	3.6
Metals (mg/kg)			
Arsenic	7.24	41.6	35
Barium	N/A	N/A	48
Cadmium	0.676	4.21	3
Chromium	52.3	160.4	62
Copper	18.7	108.2	390
Iron	N/A	N/A	220,000
Lead	30.24	112.18	400
Mercury	0.13	0.696	0.41
Selenium	N/A	N/A	1
Silver	0.73	1.77	3.1

TEL STANDS FOR THRESHOLD EFFECTS LEVEL
PEL STANDS FOR PROBABLE EFFECTS LEVEL
AET STANDS FOR APPARENT EFFECTS THRESHOLD
--CNE-- STANDS FOR CRITERIA NOT EXCEEDED



NOTES:

1. THE RESULTS LISTED FOR EACH BORING LOCATION SHOW ONLY THOSE RESULTS FOR COMPOUNDS DETECTED ABOVE THE METHOD QUANTITATION LIMIT THAT ALSO EXCEED THE LOWEST COMPARISON CRITERIA FOR THE COMPOUNDS DETECTED (IE. IF A COMPOUND WAS DETECTED, BUT NOT SHOWN, IT IS BECAUSE IT DOES NOT EXCEED ITS COMPARISON CRITERION). A COMPLETE LISTING OF SAMPLING RESULTS IS PRESENTED IN TABLE 1.
2. MARINE SEDIMENT GUIDELINES FROM NOAA SCREENING QUICK REFERENCE TABLES (SQUIRT), BUCHMAN 1999.
3. SHALLOW REFERS TO 0.0-2.0 FEET BELOW SEDIMENT SURFACE.
4. COORDINATE SYSTEM IS IN FEET AND REFERS TO MARYLAND STATE GRID, BASED ON NAD83.
5. THE BATHYMETRY SURVEY WAS PERFORMED BY WATERWAY SURVEYS & ENGINEERING, LTD. OF VIRGINIA BEACH, VIRGINIA DURING THE PERIOD APRIL 2004 AND FEBRUARY 2006. THE SOUNDINGS ARE IN FEET AND REFER TO THE MEAN LOWER LOW WATER (MLLW) BASED ON N.O.S. RECORDING TIDE GAGE AT FORT McHENRY. (USC&G MLLW + 0.84 FT = NAVD88)
6. FORMERLY MDE DR2 FIGURE 2C.

LEGEND

HA-101 — LOCATION AND DESIGNATION OF WATER-BASED VIBRACORES (HA-116 THROUGH HA-127) DRILLED BY ALPINE OCEAN SEISMIC SURVEY, INC. OF NORWOOD, NEW JERSEY DURING THE PERIOD 21 THROUGH 24 AUGUST 2007.

N E S W

0 500 1000
SCALE IN FEET

Sparrows Point LNG

AES SPARROWS POINT PROJECT
CONSOLIDATED DREDGING PLAN
BALTIMORE COUNTY, MARYLAND

AUGUST 2007 DEEP
VIBRACORE AND SEDIMENT SAMPLES
NOAA SCREENING CONCENTRATIONS

PREPARED BY:
HALEY & ALDRICH

SCALE: AS SHOWN
MAY 2008

FIGURE 2-4

G:\PROJECTS\32907\CAD\BORING LOC PLAN WITH SED EXC DRAWINGS\2007 0921_SAMPLE RESULTS_CDP.DWG

32907-001 E01

Appendix A

WASTE MANAGEMENT

WASTE MANAGEMENT
8000 Chambers Road
Charles City, VA 23030

November 1, 2007

Mr. Dan Morrow
Clean Earth, Inc.
3340 Warminster Road
Hatboro, PA 19040

Re: Waste Acceptance of Dredge Material from Baltimore, MD Project

Please accept this letter as confirmation that Waste Management can accommodate an annual volume of 2,500,000 tons per year of environmentally approved Dredge Material from Baltimore, Maryland. The Dredge Material will be directed by Waste Management as they see fit between the five (5) sites below, based on daily volumes.

Amelia Landfill
20221 Maplewood Road
Jetersville, VA 23083
VADEQ Permit Number 540

Atlantic Waste Disposal, Inc.
3474 Atlantic Lane
Waverly, VA 23890
VADEQ Permit Number 562

Charles City Landfill
8000 Chambers Road
Charles City, VA 23030
VADEQ Permit Number 531

King George Landfill
10376 Bullock Drive
King George, VA 22485
VADEQ Permit Number 586

Middle Peninsula Landfill
3714 Waste Management Way
Glenns, VA 23149
VADEQ Permit Number 572

Waste Approvals and Annual re-certifications will be pending a completed, signed Generators Non Hazardous Waste Profile Sheet and Analyticals.

If you have any questions, please do not hesitate to call me at (804) 512-7800.

Sincerely,

Tom Foley

Tom Foley
Industrial Account Representative

From everyday collection to environmental protection, Think Green® Think Waste Management.

Printed on 100% post consumer recycled paper.

ALLIED WASTE SERVICES

TO: David Haskins, Landfill Sales Manager

FROM: Tim Schotsch, GM-King and Queen Landfill

RE: Beneficial Use and Disposal of Port of Baltimore Dredge

DATE: September 6, 2007

This inter-office memo confirms our telephone conversation regarding the ability of King and Queen Landfill to accept dredged soils from the Port of Baltimore.

In accordance with our VDEQ Solid Waste Operating Permit-554 and our King and Queen County Lease Agreement, clean and approved non-hazardous dredged soils may be accepted at the King and Queen Landfill. Depending on the level of contamination, dredged soils may be beneficially used as an alternate daily cover (ADC), directly co-disposed with solid waste, and may either be stockpiled on the currently lined disposal areas or stockpiled within the 269 acre permitted landfill footprint.

Our Operating Plan anticipates continuous operations through 2043 and the need for approximately 200,000 tons of daily soil cover per year. Approved clean and contaminated dredged soils may be stockpiled on portions of the currently 125 lined disposal areas. Approved clean soils may also be stockpiled within the remaining 145 areas of future landfill disposal areas.

In accordance with our King and Queen Lease Agreement, beneficially used materials are not defined as a Solid Waste and are not counted against our 4000 tons per day daily Solid Waste cap. According to our 1993 Lease Agreement and as stated on page 7, "Soil, clay, and similar materials placed on or in the Landfill for the sole purpose of providing temporary or final cover shall not be included in the definition of Solid Waste". Our VDEQ Operating Permit does not restrict or regulate waste volumes entering the King and Queen Landfill.

Therefore, based on the limited information shared, all or a majority portion of the 3.7 million cubic yards of dredged soils from the Port of Baltimore may be eligible for disposal or beneficial use as an ADC at the King and Queen Landfill.

Appendix B

Raw and Amended Dredged Material Meeting the Residential Cleanup Standard for Maryland

Proposed Beneficial Use/Upland Disposal	Dredged Material Physical Characteristics	Potential Admixtures	Admixture Ratio (by weight)	Geotechnical Requirements	Chemical Testing Required	Chemical Sampling Frequency	Removal and Transport By	Exclusions
Landfill Closure - Cap - Above Barrier	silt and/or sand	Portland Cement	6-12%	<4" particle size; minimum 85% to 90%modified proctor density Permeability >= 1 x 10-4 cm/sec	1, 2 ,3 ,4 & 5	TBD	Truck	
Landfill Closure - Barrier Layer	clay	NA	0%	<2" particle size; minimum 90% to 95% modified proctor density Permeability < 1x10-5 cm/sec	1, 2 ,3 ,4 & 5	TBD	Truck	
	silt and/or sand	Portland Cement	6-12%	<2" particle size; minimum 90% to 95% modified proctor density Permeability < 1x10-5 cm/sec	1, 2 ,3 ,4 & 5	TBD	Truck	
Quarry and/or Mine Reclamation - Maryland	silt and/or sand	Portland Cement, Off-spec Lime or Cement Products	8-33%	<12" particle size; minimum 85% modified proctor density	1, 2 ,3 ,4 & 5	TBD	Truck/Rail	
Quarry and/or Mine Reclamation - Maryland	clay	NA	0%	<12" particle size; minimum 85% modified proctor density	1, 2 ,3 ,4 & 5	TBD	Truck/Rail	
General Fill Material	silt and/or sand	Portland Cement or None	6-12%	<6" particle size; minimum 85% to 95% modified proctor density; compressive strength, CBR dependent upon use	1, 2 ,3 ,4 & 5	TBD	Truck	
Portland Cement Feedstock	silt and or sand	NA	0%	<8" particle size; inorganic content meeting spec for mix	1, 2 ,3 ,4 & 5	TBD	Truck	
Concrete Batch Plant Feedstock	sand	NA	0%	Grain size; chlorides; organic and inorganic content meeting spec for mix	1, 2 ,3 ,4 & 5	TBD	Truck	
Golf Course Contouring Material	silt and/or sand	Portland Cement	6-12%	<4" particle size; minimum 85% modified proctor density	1, 2 ,3 ,4 & 5	TBD	Truck	

MDE Residiential Soil Cleanup Standard from "State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater, August 2001, Interim Final Guidance", Table 1

Raw and Amended Dredged Material Meeting the Non Residential Cleanup Standard for Maryland

Proposed Beneficial Use/Upland Disposal	Dredged Material Physical Characteristics	Potential Admixtures	Admixture Ratio (by weight)	Geotechnical Requirements	Chemical Testing Required	Chemical Sampling Frequency	Removal and Transport By	Exclusions
Landfill Daily Cover Material	silt and/or sand	Portland Cement, Off-spec Lime or Cement Products	8-33%	<4" particle size; minimum 85% to 90%modified proctor density Permeability >= 1 x 10-4 cm/sec	1, 2 ,3 ,4 & 5	TBD	Truck	
Brownfield Site - Grading/Capping Material	silt and/or sand	Portland Cement	6-12%	<6" particle size; minimum 85% to 95% modified proctor density; compressive strength, CBR dependent upon use	1, 2 ,3 ,4 & 5	TBD	Truck	
Quarry and/or Mine Reclamation - Maryland	silt and/or sand	Portland Cement, Off-spec Lime or Cement Products	8-33%	<12" particle size; minimum 85% to 95% modified proctor density; compressive strength, CBR dependent upon use	1, 2 ,3 ,4 & 5	TBD	Truck/Rail	
Sparrow's Point Site Fill	silt and/or sand	Portland Cement, Coal Fly Ash, Off-spec lime or cement products.	0-33%	TBD	1, 2 ,3 ,4 & 5	TBD	Truck	
Sparrow's Point Site Fill	clay	NA	0%	TBD	1, 2 ,3 ,4 & 5	TBD	Truck	

MDE Non Residiential Soil Cleanup Standard from "State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater, August 2001, Interim Final Guidance", Table 1

Raw and Amended Dredged Material Meeting the EPA Region III Risk Based Criteria and or New Jersey Department of Environmental Protection Non Residential Direct Contact Soil Cleanup Criteria

Proposed Beneficial Use/Upland Disposal	Dredged Material Physical Characteristics	Potential Admixtures	Admixture Ratio (by weight)	Geotechnical Requirements	Chemical Testing Required	Chemical Sampling Frequency	Removal and Transport By	Exclusions
Sand and Gravel Quarry Reclamation - Virginia	silt and/or sand	Portland Cement, Coal Fly Ash, Off-spec lime or cement products.	8-33%	<6" to 12" particle size; minimum 85% to 95% modified proctor density; compressive strength, CBR dependent upon site end use	1, 2 ,3 ,4 & 5	TBD	Water	
Quarry and/or Mine Reclamation - Virginia	clay	NA	0%	<6" to 12" particle size; minimum 85% to 95% modified proctor density; compressive strength, CBR dependent upon site end use	1, 2 ,3 ,4 & 5	TBD	Water	

EPA Region III RBC updated April 2007
NJDEP Non-Residential Direct Contact Soil Cleanup Criteria from, "Proposed Cleanup Standards for Contaminated Sites, NJDEP" revised May 12, 1999

Raw and Amended Dredged Material exceeding the Non Residential Cleanup Standard for Maryland, but not exceeding RCRA Hazardous Characteristics

Proposed Beneficial Use/Upland Disposal	Dredged Material Physical Characteristics	Potential Admixtures	Admixture Ratio (by weight)	Geotechnical Requirements	Chemical Testing Required	Chemical Sampling Frequency	Removal and Transport By	Exclusions
Landfill Closure - Grading Material (Under Impermeable Cap)	silt and/or sand	Portland Cement, Coal Fly Ash, Municipal Incinerator Ash, Off-spec lime or cement products.	0-33%	<6" particle size; minimum 85% to 95% modified proctor density; cushion layer < 2" particle size	6, 7, 8, 9, 10, 11, 12, 13 & 14	TBD	Truck	
Non-hazardous Treatment or Disposal Facility	silt and/or sand	Portland Cement, Coal Ash, Municipal Incinerator Ash or Off-spec Lime or Cement Products	6-18%	Moisture Percentage < 25%	3, 5, 6, 11, 12 & 13	TBD	Truck/Rail	

RCRA Characteristics from 40 CFR Part 261 Subpart C

Raw and Amended Dredged Material exceeding the RCRA Hazardous Characteristics

Proposed Beneficial Use/Upland Disposal	Dredged Material Physical Characteristics	Potential Admixtures	Admixture Ratio (by weight)	Geotechnical Requirements	Chemical Testing Required	Chemical Sampling Frequency	Removal and Transport By	Exclusions
Hazardous Materials Treatment or Disposal Facility*	silt and/or sand	Portland Cement, Coal Fly Ash, Municipal Incinerator Ash, Off-spec lime or cement products.	0-12%	Moisture Percentage < 25%	6, 7, 8, 9, 10, 11, 12, 13 & 14	TBD	Truck/Rail	

RCRA Characteristics from 40 CFR Part 261 Subpart C

*** Hazardous Waste TSDF include:**

Veolia Environmental Services
105 Willow Springs Circle
York, PA

Waste Management
4622 Wedgewood Boulevard
Frederick, MD 21704

Clean Earth of North Jersey
115 Jacobus Avenue
South Kearny, NJ 07032

1 = Volatile Organic Compounds by EPA Method SW846-8260B
2 = Semivolatile Organic Compounds by EPA Method SW846-8270C
3 = Pesticides/PCBs by EPA Method SW846-808A/8082
4 = TAL Metals by EPA Method SW846-6010B/7471A
5 = Total Petroleum Hydrocarbons by EPA Method SW846-8015M
6 = TCLP Metals by EPA Method SW1311/6010/7000
7 = TCLP Volatiles by EPA Method SW1311/8260
8 = TCLP Semivolatiles by EPA Method SW1311/8270
9 = TCLP Pesticides by EPA Method SW1311/8081
10 = TCLP Herbicides by EPA Method SW1311/8150
11 = Ignitability by EPA Method SWA846-1030
12 = Corrosivity by EPA Method SW846-9040
13 = BTEX by EPA Method SW846-8260B
14 = Reactvity by EPA Method SW846-7.3.3.2/7.3.4.2

Appendix C

LandAmerica
Commonwealth

Commonwealth Land Title Insurance Company
31 Light Street, Suite 500
Baltimore, MD 21202-1035
phone: 410 752-7070 fax: 410 752-7043
www.landam.com

June 2, 2006

VIA HAND DELIVERY
Christopher R. West, Esquire
Semmes, Bowen & Semmes
250 West Pratt Street
Baltimore, Maryland 21201

RE: AES Sparrows Point LNG, LLC
SPS Limited Partnership, LLLP
Memorandum of Option Agreement
Our File No. 22514-105

Dear Mr. West:

Enclosed please find a copy of the Memorandum of Option Agreement dated November 3, 2005 by and between SPS Limited partnership LLLP, a Maryland limited liability limited partnership and AES Sparrows Point Lng, LLC, a Delaware limited liability company. This is to confirm that the Memorandum of Option Agreement was recorded among the Land Records of Baltimore County on June 1, 2006,

If you have any questions regarding the above, please do not hesitate to contact the undersigned.

Very truly yours,

John Franetovich

John Franetovich

JEF/dln
Enclosures

MEMORANDUM OF OPTION AGREEMENT

THIS MEMORANDUM OF OPTION AGREEMENT is made as of the 3rd day of November, 2005 by and between **SPS LIMITED PARTNERSHIP LLLP**, a Maryland limited liability limited partnership, having a principal place of business at 600 Shipyard Road, Baltimore, Maryland 21219 ("Landlord"), and **AES SPARROWS POINT LNG, LLC**, a Delaware limited liability company, having a principal place of business at 4300 Wilson Boulevard, Arlington, Virginia 22203 ("Tenant").

WHEREAS, by a certain Option Agreement dated November 3, 2005 (hereinafter referred to as the "Option Agreement"), Landlord agreed to lease to Tenant the premises ("Premises") described in the Option Agreement and also set forth in Item 4 below, subject to the terms, covenants, and conditions set forth in the Option Agreement; and

WHEREAS, Landlord and Tenant have executed this Memorandum in accordance with Section 3-101(f) of the Real Property Article, Annotated Code of Maryland, for the purpose of submitting it to be recorded among the Land Records of Baltimore County, Maryland.

NOW, THEREFORE, WITNESSETH, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto state as follows with respect to the Option Agreement:

1. Names of the parties:

   Landlord: **SPS LIMITED PARTNERSHIP LLLP**
   Tenant: **AES SPARROWS POINT LNG, LLC**

2. The addresses of the parties set forth in the Option Agreement:

   Landlord's Address: 40 Shawmut Road, Suite 200, Canton, Massachusetts 02021
   Tenant's Address: 4300 Wilson Boulevard, Arlington, Virginia 22203

3. Reference to the Option Agreement:

   The Option Agreement was executed by and between Landlord and Tenant and was dated as of November 3, 2005.

4. Description of the Premises as set forth in the Option Agreement:

   A portion of the Sparrows Point Shipyard being more particularly described on Exhibit B annexed hereto; the Sparrows Point Shipyard itself being more particularly described on Exhibit A annexed hereto.

5. Nature of Interest or the Right Created:

NYDOCS/1241743.1

Right to enter into a lease for the Premises described in Item 4 above for a period of seven (7) years, with thirteen (13) options to extend for periods of seven (7) years each.

6. Term of the Option Agreement: Four (4) years

   Commencement date: November 3, 2005

   Termination date: November 2, 2009

7. If there is a right of extension or renewal of the Option Agreement, the maximum period for which or date to which it may be renewed: N/A

IN WITNESS WHEREOF, the parties have executed this Memorandum as of the day and year first above written.

WITNESS/ATTEST:

Denise M Kelly

SPS LIMITED PARTNERSHIP LLLP, a Maryland limited liability limited partnership

By:__________
Name Printed: Vincent A Barletta
Title: Manager

Stella O. Gryb

AES SPARROWS POINT LNG, LLC, a Delaware limited liability company

By:__________
Name Printed: Scott J. Taylor
Title: Vice President

STATE OF Massachusetts)
) to wit:
CITY/COUNTY OF Norfolk)

I HEREBY CERTIFY that on the 21 day of February, 2006, before me, the subscriber, a Notary Public of the State of aforesaid, personally appeared Vincent F. Barletta, who acknowledged himself/herself to be the Manager of **SPS LIMITED PARTNERSHIP LLLP,** a Maryland limited liability limited partnership, and that he/she, as the Manager of **SPS LIMITED PARTNERSHIP LLLP,** being authorized to do so, executed the foregoing Memorandum of Option Agreement for the purposes contained in the document, by signing the name of **SPS LIMITED PARTNERSHIP LLLP** as the Landlord.

IN WITNESS WHEREOF, I set my hand and official seal.

[NOTARY SEAL]

Notary Public

Printed Name of Notary Public
My Commission Expires:

STATE OF Connecticut)
) to wit:
CITY/COUNTY OF New Haven)

I HEREBY CERTIFY that on the 1st day of February, 2006, before me, the subscriber, a Notary Public of the State of aforesaid, personally appeared Scott J. Taylor, who acknowledged himself/herself to be the Vice President of **AES SPARROWS POINT LNG, LLC,** a Maryland limited liability limited partnership, and that he/she, as the Vice President of **AES SPARROWS POINT LNG, LLC,** being authorized to do so, executed the foregoing Memorandum of Option Agreement for the purposes contained in the document, by signing the name of **AES SPARROWS POINT LNG, LLC** as the tenant.

IN WITNESS WHEREOF, I set my hand and official seal.

[NOTARY SEAL]

Notary Public

Joseph Giaccone
Printed Name of Notary Public
My Commission Expires: April 30, 2006

JOSEPH GIACCONE
NOTARY PUBLIC
MY COMMISSION EXPIRES APR. 30, 2006

NYDOCS/1241743.1

I hereby certify that the foregoing instrument was prepared by or under the supervision of the undersigned Maryland attorney.

Emerson L. Dorsey, Jr.

Emerson L. Dorsey, Jr.

AFTER RECORDING, RETURN TO:
Christopher R. West
Semmes, Bowen & Semmes
250 West Pratt Street, Suite 1600
Baltimore, Maryland 21201

EXHIBIT A

File No. 22514-105 **Commitment No. 22514-105**

LEGAL DESCRIPTION

PARCEL NO. 1

Being known and designated as that parcel identified as, "PARCEL SY AREA – 226.3575 ACRES" on the subdivision plat entitled, "SUBDIVISION PLAT OF PART OF THE PROPERTY OF BETHLEHEM STEEL CORPORATION", which plat is recorded among the Land Records of Baltimore County, Maryland in Plat Book 69, page 87 and 88.

PARCEL NO. 2

TOGETHER WITH the non-exclusive "INGRESS EGRESS EASEMENT" over and along the two (2) private roads known as Riverside Drive and Shipyard Road, as more particularly set forth in the Deed dated September 30, 1997 by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 436.

PARCEL NO. 3

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [202] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 501.

PARCEL NO. 4

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [203] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 512.

PARCEL NO. 5

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [204] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 523.

LandAmerica Commonwealth

CONTINUATION

File No. 22514-105 **Commitment No. 22514-105**

LEGAL DESCRIPTION

PARCEL NO. 6

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement **[205]** by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 536.

PARCEL NO. 7

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement **[206]** by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 545.

PARCEL NO. 8

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement **[207]** by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 558.

PARCEL NO. 9

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement **[208]** by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 571.

PARCEL NO. 10

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement **[209]** by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 584.

CONTINUATION

File No. 22514-105 **Commitment No. 22514-105**

LEGAL DESCRIPTION

PARCEL NO. 11

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [210] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 597.

PARCEL NO. 12

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [228] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 609.

PARCEL NO. 13

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [211] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 621.

PARCEL NO. 14

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [212] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 629.

PARCEL NO. 15

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [213] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 640.

CONTINUATION

File No. 22514-105 **Commitment No. 22514-105**

LEGAL DESCRIPTION

PARCEL NO. 16

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [214] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 652.

PARCEL NO. 17

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [215] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 664.

PARCEL NO. 18

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [216] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 676.

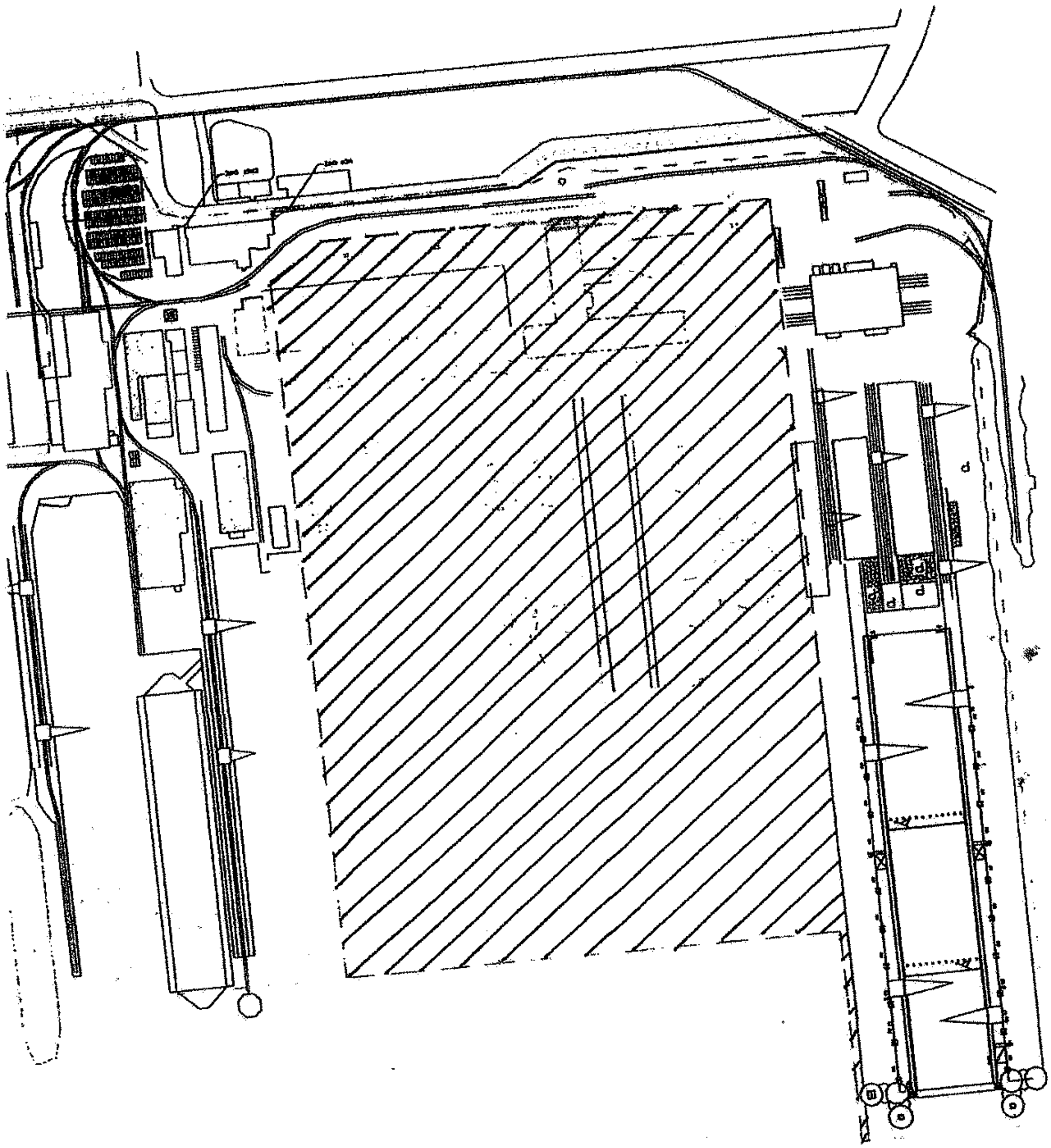
PARCEL NO. 19

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [217] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 687.

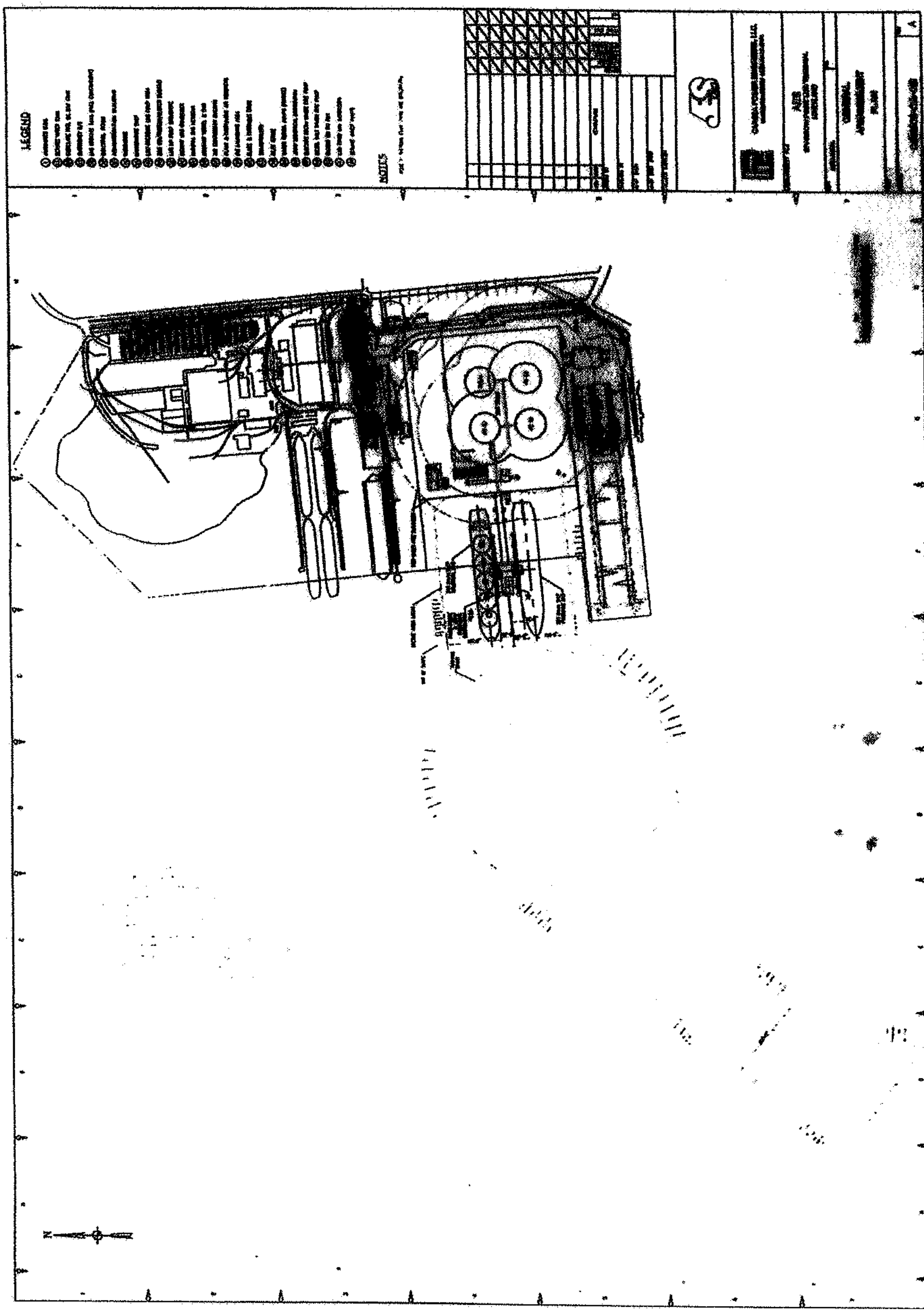
PARCEL NO. 20

TOGETHER WITH an easement and right of way more particularly set forth in the Agreement [232] by and between Bethlehem Steel Corporation and Baltimore Marine Industries, Inc., dated September 30, 1997 and recorded among the Land Records of Baltimore County in Liber No. 12425, folio 696.

EXHIBIT B



OPTION PREMISES – [hatched symbol]


LEGEND
NOTES

Circuit Court for
BALTIMORE COUNTY
Clerk of the Court,
SUZANNE MENSH
COUNTY COURTS BUILDING
401 BOSLEY AVE. P.O. BOX 6754
TOWSON, MD 21285-6754
(410) 887-2601

Transaction Block:	65
Ref: SPS LMT PA	
AGREEMENT-MODIFY	AMOUNT
IMP FD SURE $20.00	20.00
RECORDING FEE 75	75.00
SUBTOTAL:	95.00
TOTAL CHARGES:	95.00
PAYMENTS	
CHECK	95.00
TOTAL TENDERED:	95.00

Cashier: JLF Reg # BA04
Rcpt # 1866
Date: Jun 01, 2006 Time: 09:27 am

LandAmerica Commonwealth

Commonwealth Land Title Insurance Company
31 Light Street, Suite 500
Baltimore, MD 21202-1035
phone: 410 752-7070 fax: 410 752-7043
www.landam.com

April 10, 2007

VIA FIRST CLASS MAIL
Christopher R. West, Esquire
Semmes, Bowen & Semmes
250 West Pratt Street
Baltimore, Maryland 21201

RE: AES Sparrows Point LNG, LLC
SPS Limited Partnership, LLLP
Memorandum of Option Agreement
Our File No. 22514-105

Dear Mr. West:

Enclosed please find the original Memorandum of First Amendment of Option Agreement dated November 27, 2006 and recorded among the Land Records of Baltimore County in Liber 25216, folio 263 by and between SPS Limited Partnership LLLP and AES Sparrows Point LNG, LLC.

If you have any questions regarding the above, please do not hesitate to contact the undersigned.

Very truly yours,

John Franetovich

JEF/dln
Enclosures

MEMORANDUM OF FIRST AMENDMENT OF OPTION AGREEMENT

THIS MEMORANDUM OF FIRST AMENDMENT OF OPTION AGREEMENT is made as of the ~~24~~ 27th day of ~~October~~ November 2006 by and between **SPS LIMITED PARTNERSHIP LLLP**, a Maryland limited liability limited partnership, having a principal place of business at 40 Shawmut Road-Suite 200, Canton, Massachusetts 02021 ("Landlord"), and **AES SPARROWS POINT LNG, LLC**, a Delaware limited liability company, having a principal place of business at 4300 Wilson Boulevard, Arlington, Virginia 22203 ("Tenant").

WHEREAS, by a certain Option Agreement dated November 3, 2005 (hereinafter referred to as the "Original Option Agreement"), a Memorandum of which (the "Memorandum") was recorded in the Land Records of Baltimore County, Maryland on June 1, 2006 in SM23931, p. 71, Landlord agreed to lease to Tenant certain premises described in the Original Option Agreement and also set forth in Item 4 of the Memorandum, subject to the terms, covenants, and conditions set forth in the Option Agreement; and

WHEREAS, by a certain First Amendment of Option Agreement dated as of even date herewith (hereinafter referred to as the "First Amendment"; the Original Option Agreement, as amended by the First Amendment, is hereinafter referred to as the "Option Agreement"), Landlord and Tenant amended the Original Option Agreement to, among other things, amend the premises that Tenant has an option to Lease (the "Premises"), all as more particularly described in the First Amendment and also set forth in Item 4 below, subject to the terms, covenants, and conditions set forth in the Option Agreement; and

WHEREAS, Landlord and Tenant have executed this Memorandum of First Amendment of Option Agreement in accordance with Section 3-101(f) of the Real Property Article, Annotated Code of Maryland, for the purpose of submitting it to be recorded among the Land Records of Baltimore County, Maryland.

NOW, THEREFORE, WITNESSETH, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto state as follows with respect to the First Amendment:

1. Names of the parties:

   Landlord: **SPS LIMITED PARTNERSHIP LLLP**
   Tenant: **AES SPARROWS POINT LNG, LLC**

2. The addresses of the parties set forth in the First Amendment:

   Landlord's Address: 40 Shawmut Road, Suite 200, Canton, Massachusetts 02021
   Tenant's Address: 4300 Wilson Boulevard, Arlington, Virginia 22203

3. Reference to the First Amendment:

   The First Amendment was executed by and between Landlord and Tenant and was dated as of October 24, 2006.

4. Description of the Premises as set forth in the First Amendment:

Either the "Alternate A" lease area shown on **Exhibit B-1** annexed hereto and made a part hereof, together with all right, title and interest of Landlord, if any, in and to the dolphin located beyond the property line in the waters abutting such lease area ("**Alternate A**"), or the "Alternate B" lease area shown on **Exhibit B-2** annexed hereto and made a part hereof ("**Alternate B**").

5. Nature of Interest or the Right Created:

Right to enter into a lease for either the Alternate A or the Alternate B Premises described in Item 4 above for a period of seven (7) years, with thirteen (13) options to extend for periods of seven (7) years each.

6. Term of the Option Agreement: Four (4) years

Commencement date: November 3, 2005

Termination date: November 2, 2009

7. If there is a right of extension or renewal of the Option Agreement, the maximum period for which or date to which it may be renewed: N/A

IN WITNESS WHEREOF, the parties have executed this Memorandum as of the day and year first above written.

WITNESS/ATTEST:

SPS LIMITED PARTNERSHIP LLLP, a Maryland limited liability limited partnership

Denise M Kelly

By:________________________
By Sparrows Point Shipyard LLC
Its General Partner
Name Printed: Vincent F. Barletta_______
Title: Manager____________________

AES SPARROWS POINT LNG, LLC, a Delaware limited liability company

Ruth M Stevens
- Ruth M. Stevens

By:________________________
Name Printed: Scott T. Taylor
Title: Vice President

NYDOCS/1265580.1

STATE OF MASSACHUSETTS)
) to wit:
CITY/COUNTY OF NORFOLK)

I HEREBY CERTIFY that on the 27th day of ~~October~~ November 2006, before me, the subscriber, a Notary Public of the State of aforesaid, personally appeared Vincent F. Barletta who acknowledged himself/herself to be the Manager of Sparrows Point Shipyard LLC as General Partner of **SPS LIMITED PARTNERSHIP LLLP,** a Maryland limited liability limited partnership, and that he/she, as the Manager of Sparrows Point Shipyard LLC as General Partner of **SPS LIMITED PARTNERSHIP LLLP,** being authorized to do so, executed the foregoing Memorandum of Option Agreement for the purposes contained in the document, by signing the name of **SPS LIMITED PARTNERSHIP LLLP** in such capacity.

IN WITNESS WHEREOF, I set my hand and official seal.

[NOTARY SEAL]

Denise M Kelly
Notary Public

Denise M. Kelly
Printed Name of Notary Public
My Commission Expires: August 9, 2007

STATE OF Connecticut)
) to wit:
CITY/COUNTY OF New Haven)

I HEREBY CERTIFY that on the 17th day of November, 2006, before me, the subscriber, a Notary Public of the State of aforesaid, personally appeared Scott J. Taylor who acknowledged himself/herself to be the Vice President of **AES SPARROWS POINT LNG, LLC,** a Maryland limited liability limited partnership, and that he/she, as the Vice President of **AES SPARROWS POINT LNG, LLC,** being authorized to do so, executed the foregoing Memorandum of Option Agreement for the purposes contained in the document, by signing the name of **AES SPARROWS POINT LNG, LLC** as the Vice President.

IN WITNESS WHEREOF, I set my hand and official seal.

[NOTARY SEAL]

[signature]
Notary Public

Joseph Giaccone
Printed Name of Notary Public
My Commission Expires: April 30, 2011

JOSEPH GIACCONE NOTARY PUBLIC CONNECTICUT My Comm. Exp. April 30, 2011

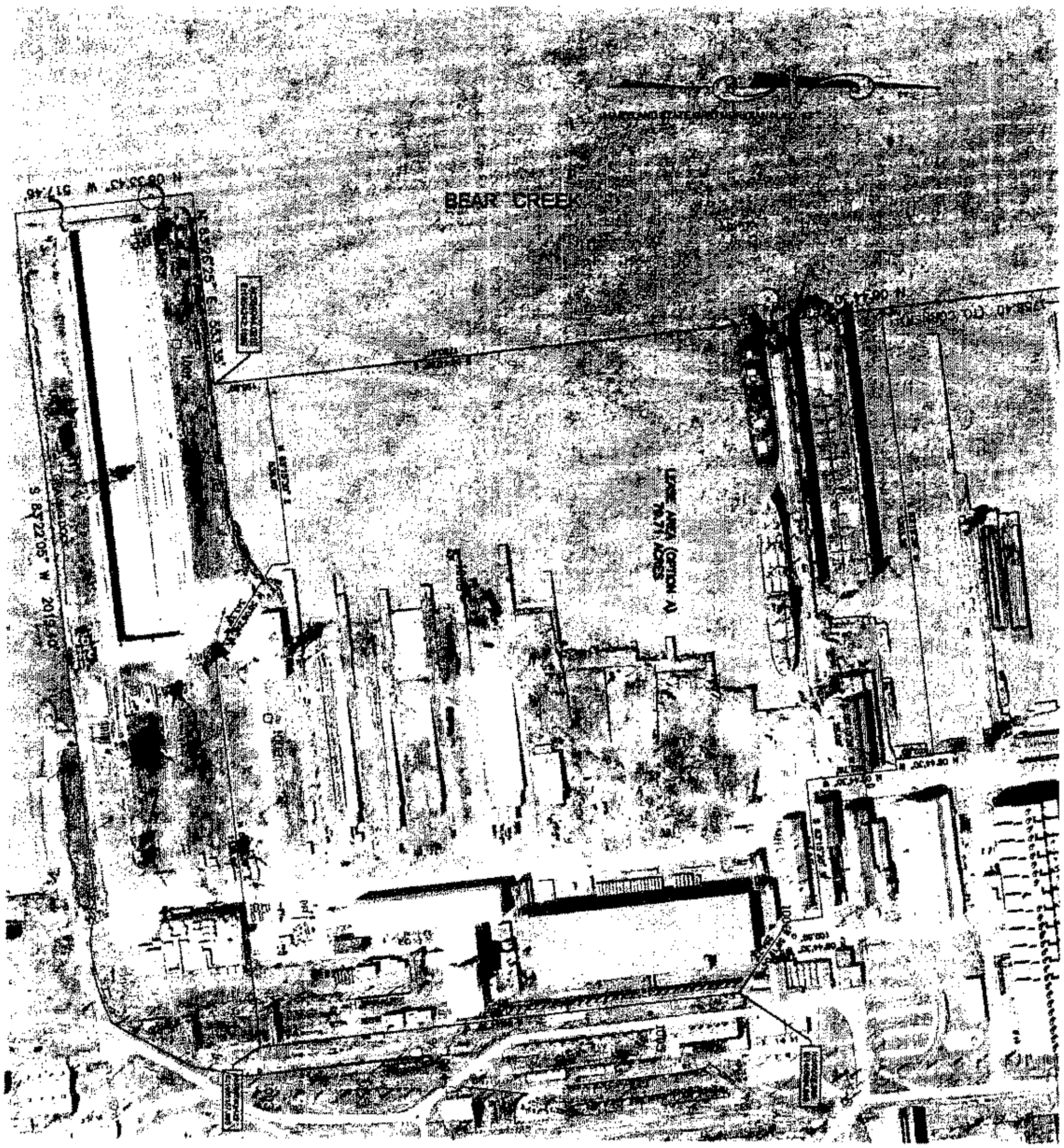
I hereby certify that the foregoing instrument was prepared by or under the supervision of the undersigned Maryland attorney.

____

AFTER RECORDING, RETURN TO:

LandAmerica
Commonwealth
22514-105
Commonwealth Land Title Insurance Company
31 Light Street, Suite 500
Baltimore, Maryland 21202-1035

Exhibit B-1



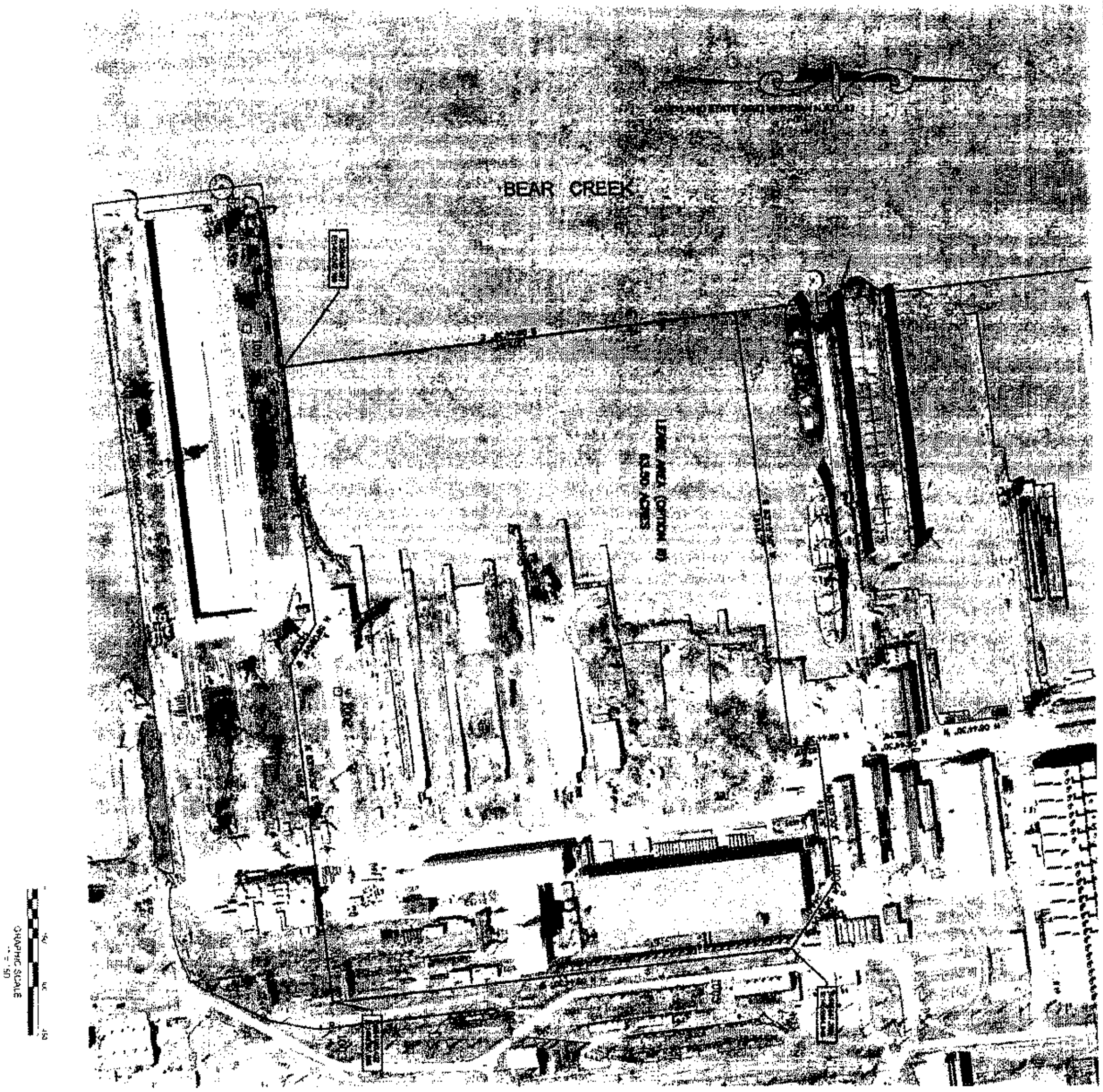
JOHN A. STANLEY

LEASE EXHIBIT
SPARROW'S POINT
15TH ELECTION DISTRICT
BALTIMORE COUNTY, MARYLAND
TAX ACCOUNT NO. 15-02-024000

TWT
TAYLOR WISEMAN & TAYLOR

CLERK'S NOTATION
Document submitted for record in a condition not permitting satisfactory photographic reproduction.

Exhibit B-2



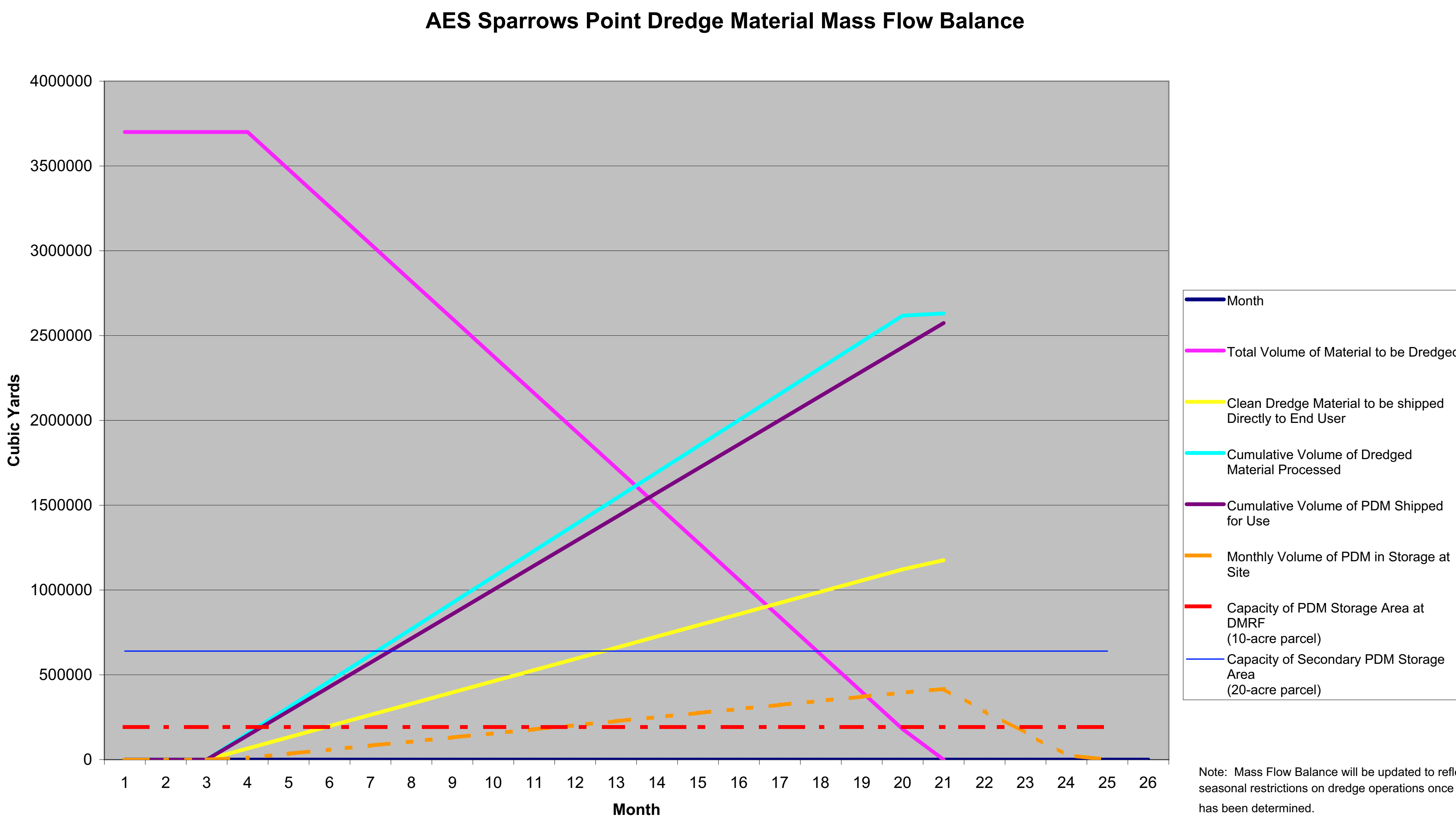
JOHN A. STANLEY

LEASE EXHIBIT
SPARROW'S POINT
15TH ELECTION DISTRICT
BALTIMORE COUNTY, MARYLAND
TAX ACCOUNT NO. 15-42-024000

TWT
Taylor Wiseman & Taylor

CLERK'S NOTATION
Document submitted for record in a condition not permitting satisfactory photographic reproduction.

Appendix D



Note: Mass Flow Balance will be updated to reflect potential seasonal restrictions on dredge operations once a start date has been determined.

Appendix E

TABLE 9A-16 (Revised 5-21-08): EMISSIONS CALCULATIONS - LNG TERMINAL OPERATING EMISSIONS

LNG Terminal Maintenance Dredging Activities

Onshore Processing and Stockpiling Activities

Equipment	no. of units	Bhp	Load factor	Emission Factors Basis
Water Trucks	2	300	50%	Pre-EPA Tier 1
Backhoes	2	85	50%	EPA Tier 1
Dozers	2	185	50%	EPA Tier 1
Excavators	6	225	50%	EPA Tier 1
Loaders	4	300	50%	EPA Tier 1
Trucks	6	355	50%	EPA Tier 1
Sweepers	1	200	50%	EPA Tier 1
Skid Steers	2	80	50%	EPA Tier 1
BSFC, lb/hp-hr (>100 hp)	0.367			
BSFC, lb/hp-hr (<100hp)	0.408			
% Sulfur Fuel	0.05	before June 1, 2010		
	0.0015	after June 1, 2010		
Engine Type	Diesel compression ignition			
Avg. Load Factor	0.5			
Operating hrs/day	12			

	2	Water Trucks			2	Backhoes			2	Dozers			6	Excavators		
	300	Bhp, each unit			85	Bhp, each unit			185	Bhp, each unit			225	Bhp, each unit		
Pollutant	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec
PM	0.33	1.00	0.028	0.055	0.33	1.97	0.015	0.031	0.33	1.23	0.021	0.042	0.33	1.23	0.025	0.152
NO_X	8.38	1.00	0.698	1.397	6.9	1.10	0.179	0.358	6.9	0.95	0.337	0.674	6.9	0.95	0.410	2.458
SO_2	0.16	1.00	0.014	0.027	0.16	1.18	0.005	0.009	0.16	1.01	0.008	0.017	0.16	1.01	0.010	0.061
CO	2.7	1.00	0.225	0.450	2.7	2.57	0.164	0.328	2.7	1.53	0.212	0.425	2.7	1.53	0.258	1.549
HC	0.68	1.00	0.057	0.113	0.68	2.29	0.037	0.074	0.68	1.05	0.037	0.073	0.68	1.05	0.045	0.268

	4	Loaders			6	Trucks			1	Sweepers			2	Skid Steers		
	300	Bhp, each unit			355	Bhp, each unit			200	Bhp, each unit			80	Bhp, each unit		
Pollutant	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec	Em. Factor[1] g/Bhp-hr	In-use Adj. Factor[2]	Ea. Unit g/sec	Total g/sec
PM	0.33	1.97	0.054	0.217	0.33	1.23	0.040	0.240	0.33	1.23	0.023	0.023	0.33	1.97	0.014	0.029
NO_X	6.9	1.10	0.633	2.530	6.9	0.95	0.646	3.878	6.9	0.95	0.364	0.364	6.9	1.1	0.169	0.337
SO_2	0.16	1.18	0.016	0.064	0.16	1.01	0.016	0.097	0.16	1.01	0.009	0.009	0.16	1.18	0.004	0.009
CO	2.7	2.57	0.578	2.313	2.7	1.53	0.407	2.444	2.7	1.53	0.230	0.230	2.7	2.57	0.154	0.308
HC	0.68	2.29	0.130	0.519	0.68	1.05	0.070	0.422	0.68	1.05	0.040	0.040	0.68	2.29	0.035	0.069

Pollutant	Total g/sec	Daily Avg. Load Fact.	Total Tons per day @ 12 hr/day	Total TPY @ max. 30 days/yr[5]
PM	0.788	0.5	0.02	0.6
NO_X	11.997	0.5	0.29	8.6
SO_2	0.293	0.5	0.01	0.2
CO	8.046	0.5	0.19	5.7
HC	1.578	0.5	0.04	1.1

Notes:

1. Pre-EPA Tier 1 based emission factors obtained from "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling --Compression-Ignition", Report No. NR-009C, revised April 2004, US EPA Office of Mobile Sources. Steady-state emission factors for CI engines obtained from Table C1, assuming 1988-95 model year, pre-Tier 1 engines. NOX emission factors for equipment meeting Tier 1 standards obtained from 40 CFR 89.112, Table 1 for applicable power rating and Tier 1 model year. SO2 emission factor based on brake-specific fuel consumption (BSFC) given in Table C1 and assuming default sulfur content (0.05%) required for the construction year in nonroad diesel fuel. PM emission factor in Table C1 adjusted for fuel sulfur content according to the equation given in Appendix C, page C5 of above-referenced EPA document [PMBase = PM + BSFC*A*)0.0033 - fuel sulfur)]. Emissions factors for equipment retrofit w/ selective catalytic reduction (SCR) + diesel particulate filters (DPF) assume 75% control of PM and 85% control of NOX from pre-Tier 1 baseline emissions factors.
2. In-use adjustment factors obtained from "Exhaust Emission Factors for Nonroad Engine Modeling --Compression-Ignition", Report No. NR-009C, revised April 2004, US EPA Office of Mobile Sources, Table A3, Transient Adjustment Factors.
3. SO_2 emission factor based on 0.05% (pre-June 1, 2010) diesel sulfur content.
4. Number, Bhp and load factors for construction equipment diesel engines estimated from data provided by Clean Earth Technologies, Inc..
5. Expected to occur approximately one month every 3 years.

TABLE 9A-16a (Revised 5-22-08): EMISSIONS CALCULATIONS - LNG TERMINAL OPERATING EMISSIONS
LNG Terminal Maintenance Dredging Activities
Onshore Processing and Stockpiling Activities

AQCR- 115

Fugitive Particulate Matter Emissions

Fugitive PM Emissions from Construction Vehicle Movement on Unpaved Roads at Construction Sites

EPA Unpaved Roads particulate emissions factor equation and assumptions for empirical constants:

	Reference	Value for PM10	Value for PM2.5
s = surface silt content (%)	USEPA AP-42 Table 13.2.2-1 mean value for construction sites	8.5	8.5
W = mean vehicle weight (tons)	See table below	See table below	See table below
k (lb/VMT) empirical constant	USEPA AP-42, Table 13.2.2-2	1.5	0.15
a empirical constant	USEPA AP-42, Table 13.2.2-2	0.9	0.9
b empirical constant	USEPA AP-42, Table 13.2.2-2	0.45	0.45
P = number of days in a year w/ at least 0.01 in. precip.	USEPA AP-42 Figure 13.2.2-1	140	140
E (lb/VMT) = $k (s/12)^a (W/3)^b$ = size-specific emission factor	USEPA AP-42, Section 13.2.2-4, equation (1a)	See table below	See table below
E_{ext} (lb/VMT) = E [(365-P)/365] = annual size-specific emission factor extrapolated for natural mitigation (precipitation)	USEPA AP-42, Section 13.2.2-4, equation (2)	See table below	See table below

Equipment Description	Onsite Vehicular Traffic (Veh./Day)	Avg. Daily VMT/day Unpaved Roads	Estimated Vehicle Weight (tons)	Number of Constr. Months	Number of Constr. Days[3]	VMT/const period	PM10 E_{ext} (lb/VMT)	PM2.5 E_{ext} (lb/VMT)	Total PM10 (TPCP)	Total PM2.5 (TPCP)
Water Trucks	2	2	25	1.3	30	119.6	1.760	0.176	0.105	0.011
Backhoes	2	0.5	3.25	1.3	30	29.9	0.703	0.070	0.011	0.001
Dozers	2	5	22	1.3	30	299	1.662	0.166	0.248	0.025
Excavators	6	2	20	1.3	30	358.8	1.592	0.159	0.286	0.029
Loaders	4	6	32	1.3	30	717.6	1.967	0.197	0.706	0.071
Trucks	6	30	34	1.3	30	5382	2.021	0.202	5.440	0.544
Sweepers	1	20	12	1.3	30	598	1.265	0.127	0.378	0.038
Skid Steers	2	5	3	1.3	30	299	0.678	0.068	0.101	0.010
Total									**7.27**	**0.73**

Fugitive PM Emissions from Materials Handling Activities at Construction Sites

Construction Activity	Avg. Daily Matl. Handling Rate (TPD)	Number of Constr. Days	TSP (lb/ton)	PM10 Scaling Factor	PM2.5 Scaling Factor	PM10 (lb/ton)[2]	PM2.5 (lb/ton)	Total PM10 (TPCP)	Total PM2.5 (TPCP)	USEPA AP-42 Emission Factor Reference
Topsoil removal	500	30	0.058	0.75	0.105	0.0435	0.0061	0.3263	0.0457	Table 11.9-4 - topsoil removal by scraper
Excavated material unloading to storage piles or trucks	500	30	0.037	0.75	0.105	0.0278	0.0039	0.2081	0.0291	Table 11.9-4 - truck loading
Total								0.5344	0.0748	

	Total Fugitive PM Emissions/yr
PM10 (TPY)	7.8
PM2.5 (TPY)	0.80

Notes:
Blank cells indicate values not applicable, e.g., no movement of construction equipment or material handling involved.

1. Dredging Process Activities occur March 2009-May 2011 (27 months) in AQCR 115 (Baltimore).
2. PM10 emission factor is conservatively high as PM10 scaling factor in AP-42 Table 11.9-1 is applied here to TSP, rather than PM15 emission factor.
3. 23 day/month construction schedule.

TABLE 9A-17: EMISSIONS CALCULATIONS - LNG TERMINAL OPERATING EMISSIONS
LNG Terminal Maintenance Dredging Activities
Offshore - Dredging and Marine Vessel Emissions

Description	**Off-shore Start-Up Const. Equip.**
NO. of Units	1 Dredge, 1 Tug, 1 Work/Survey boat, 1 Crew boat, 1
BSFC, lb/hp-hr	0.367
% S in Fuel	0.05
Engine Type	Diesel compression ignition
# Operating Days	1
Operating hrs/day	12

	1 Dredge					**1 Tug**					**1 Survey/Work Boat**				
	1800 Bhp, each unit					**2400 Bhp, each unit**					**250 Bhp, each unit**				
Pollutant	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**
PM	1	0.261	16113.6	4206	4206	0.5	0.272	21485	5839	5839	0.5	0.272	2238	608	608
NOX	1	10.575	16113.6	170403	170403	0.5	10.805	21485	232134	232134	0.5	10.805	2238	24181	24181
SO_2	1	0.16	16113.6	2578	2578	0.50	0.16	21485	3438	3438	0.16	0.642	2238	1437	1437
CO	1	0.0059	16113.6	95	95	0.5	0.017	21485	359	359	0.5	0.017	2238	37	37
HC	1	0.0067	16113.6	108	108	0.5	0.019	21485	407	407	0.5	0.019	2238	42	42

	1 Crew Boat					**1 Inspecting/Contracting Vessel**				
	200 Bhp, each unit					**684 Bhp, each unit**				
Pollutant	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**
PM	0.5	0.272	1790	487	487	0.5	0.272	6123	1664	1664
NOX	0.5	10.805	1790	19344	19344	0.5	10.805	6123	66158	66158
SO_2	0.50	0.160	1790	286	286	0.50	0.160	6123	980	980
CO	0.5	0.017	1790	30	30	0.5	0.017	6123	102	102
HC	0.5	0.019	1790	34	34	0.5	0.019	6123	116	116

	Total g/day	**Total Tons per day @ 12 hr/day**	**Total TPY @ max. 30 days per year[3]**
Pollutant			
PM	12804	0.01	0.42
NOX	512220	0.56	16.94
SO_2	8719	0.01	0.29
CO	623	0.001	0.02
HC	707	0.001	0.02

Notes:
1 . Emission factors from "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data" EPA guidance report, February 2000, Office of Air and radiation.
2. Equipment list provided by Han Padron, Inc. and Clean Earth Technologies, Inc.
3. Expected to occur approximately one month every 3 years.

TABLE 9A-18 (Revised 2-4-08): EMISSIONS CALCULATIONS - LNG TERMINAL OPERATING EMISSIONS
LNG Terminal Maintenance Dredging Activities
Indirect Emissions from Haul Trucks and Workers Commuting

				PM10/PM2.5*			NH3			NOX			VOC			CO		
Vehicle Type	**Vehicle Trips per Day**	**Days per Year**	**Round Trip Miles**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**
Spoils Haul Trucks (HDDV)	218	30	396	0.3	2.85E-02	0.86	0.02704	2.57E-03	7.72E-02	12.69	1.21E+00	36.23	1.56	1.48E-01	4.45	6.87	6.54E-01	19.61
Additive Supply Trucks (HDDV	27	30	20	0.3	1.79E-04	0.005	0.02704	1.61E-05	4.83E-04	12.69	7.55E-03	0.23	1.56	9.29E-04	0.03	6.87	4.09E-03	0.12
Workers Commuting (LDGV)	15	30	30	0.02	9.92E-06	0.0003	0.01513	7.50E-06	2.25E-04	1.86	9.23E-04	0.03	1.22	6.05E-04	0.02	14.72	7.30E-03	0.22
Workers Commuting (LDGT)	15	30	30	0.02	9.92E-06	0.0003	0.01513	7.50E-06	2.25E-04	2.31	1.15E-03	0.03	1.82	9.03E-04	0.03	22.24	1.10E-02	0.33
Total					2.87E-02	0.86		2.60E-03	7.81E-02		1.22E+00	36.52		1.51E-01	4.53		6.76E-01	20.28

Notes:

Emission factors for NOX, VOC and CO obtained from USEPA AP-42, Appendix J (1998), with the following assumptions - 35 mph, 1995 model year, 50% cold start and 50% stabilized operation, low altitude, 100°F ambient temperature.

Emission factors for Ammonia obtained from Table III-3 of USEPA report, "Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources", April 2004.

* PM, PM10 and PM2.5 are conservatively estimated to be equivalent for combustion sources.

	In MD	In VA	In DC	Total
Total dredge haul truck one-way transit distance (km)	57	245	16	318
miles	35	152	10	198

	Baltimore & Anne Arundel Counties, MD (AQCR 115)	(Wash., DC-MD-VA AQCR) Prince George Co., MD	Wash. DC	Fairfax and Prince William Cos., VA	Attainment areas in VA
Dredge Haul Truck One-way Distances by Nonattainment Area (miles)	23	12	10	28	124
Fraction of total distance	0.12	0.06	0.05	0.14	0.63
Fraction of total distance in MD	0.65	0.34			
Fraction of total distance in VA				0.18	0.82

TABLE 9A-19 (Revised 5-22-08): EMISSIONS CALCULATIONS - LNG TERMINAL OPERATING EMISSIONS
LNG Terminal Maintenance Dredging Activities
Summary of Total Emissions from Dredging Activities

Total Tons/Year - Maintenance Dredging Activities				
Pollutant	Onshore Processing - Total Tons/Yr	Offshore Marine Vessels and Dredging - Total Tons/Yr	Indirect Emissions from Commuting Workers and Haul Trucks, Tons/Yr	Total Maintenance Dredging Tons/Yr
PM10	8.37	0.42	0.03	8.82
PM2.5	1.37	0.42	0.03	1.82
NOX	8.57	16.94	36.52	62.02
SO_2	0.21	0.29		0.50
CO	5.75	0.02	20.28	26.05
VOC	1.13	0.02	4.53	5.68
NH3**	0.112	0.006	0.078	0.195

** NH3 emissions from nonroad diesel engines calculated using proportionality of emissions factors, PM emissions * (.0044/.33).

0.0044 g/Bhp-hr derived from 1.83E-04 lb NH3/gal / (7 lb/gal diesel) x 0.367 lb diesel/Bhp-hr x 454 g/lb)

1.83E-04 lb/gal emission factor obtained from Table III-6 of USEPA report, "Estimating Ammonia Emissions from Anthropogenice Nonagricultural Sources", April 2004.

NH3 emissions from indirect sources calculated seperately, as noted on respective worksheets, using Table III-3 from above-noted USEPA reference.

TABLE 9A-18 (Revised 2-4-08): EMISSIONS CALCULATIONS - LNG TERMINAL OPERATING EMISSIONS
LNG Terminal Maintenance Dredging Activities
Indirect Emissions from Haul Trucks and Workers Commuting

				PM10/PM2.5*			NH3			NOX			VOC			CO		
Vehicle Type	**Vehicle Trips per Day**	**Days per Year**	**Round Trip Miles**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**	**Emissions Factor (g/mile)**	**Tons/day**	**Tons/Year**
Spoils Haul Trucks (HDDV)	218	30	396	0.3	2.85E-02	0.86	0.02704	2.57E-03	7.72E-02	12.69	1.21E+00	36.23	1.56	1.48E-01	4.45	6.87	6.54E-01	19.61
Additive Supply Trucks (HDDV	27	30	20	0.3	1.79E-04	0.005	0.02704	1.61E-05	4.83E-04	12.69	7.55E-03	0.23	1.56	9.29E-04	0.03	6.87	4.09E-03	0.12
Workers Commuting (LDGV)	15	30	30	0.02	9.92E-06	0.0003	0.01513	7.50E-06	2.25E-04	1.86	9.23E-04	0.03	1.22	6.05E-04	0.02	14.72	7.30E-03	0.22
Workers Commuting (LDGT)	15	30	30	0.02	9.92E-06	0.0003	0.01513	7.50E-06	2.25E-04	2.31	1.15E-03	0.03	1.82	9.03E-04	0.03	22.24	1.10E-02	0.33
Total					2.87E-02	0.86		2.60E-03	7.81E-02		1.22E+00	36.52		1.51E-01	4.53		6.76E-01	20.28

Notes:

Emission factors for NOX, VOC and CO obtained from USEPA AP-42, Appendix J (1998), with the following assumptions - 35 mph, 1995 model year, 50% cold start and 50% stabilized operation, low altitude, 100°F ambient temperature.

Emission factors for Ammonia obtained from Table III-3 of USEPA report, "Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources", April 2004.

* PM, PM10 and PM2.5 are conservatively estimated to be equivalent for combustion sources.

	In MD	In VA	In DC	Total
Total dredge haul truck one-way transit distance (km)	57	245	16	318
miles	35	152	10	198

	Baltimore & Anne Arundel Counties, MD (AQCR 115)	(Wash., DC-MD-VA AQCR) Prince George Co., MD	Wash. DC	Fairfax and Prince William Cos., VA	Attainment areas in VA
Dredge Haul Truck One-way Distances by Nonattainment Area (miles)	23	12	10	28	124
Fraction of total distance	0.12	0.06	0.05	0.14	0.63
Fraction of total distance in MD	0.65	0.34			
Fraction of total distance in VA				0.18	0.82

TABLE 9A-19 (Revised 5-22-08): EMISSIONS CALCULATIONS - LNG TERMINAL OPERATING EMISSIONS
LNG Terminal Maintenance Dredging Activities
Summary of Total Emissions from Dredging Activities

Total Tons/Year - Maintenance Dredging Activities				
Pollutant	Onshore Processing - Total Tons/Yr	Offshore Marine Vessels and Dredging - Total Tons/Yr	Indirect Emissions from Commuting Workers and Haul Trucks, Tons/Yr	Total Maintenance Dredging Tons/Yr
PM10	8.37	0.42	0.03	8.82
PM2.5	1.37	0.42	0.03	1.82
NOX	8.57	16.94	36.52	62.02
SO_2	0.21	0.29		0.50
CO	5.75	0.02	20.28	26.05
VOC	1.13	0.02	4.53	5.68
NH3**	0.112	0.006	0.078	0.195

** NH3 emissions from nonroad diesel engines calculated using proportionality of emissions factors, PM emissions * (.0044/.33).

0.0044 g/Bhp-hr derived from 1.83E-04 lb NH3/gal / (7 lb/gal diesel) x 0.367 lb diesel/Bhp-hr x 454 g/lb)

1.83E-04 lb/gal emission factor obtained from Table III-6 of USEPA report, "Estimating Ammonia Emissions from Anthropogenice Nonagricultural Sources", April 2004.

NH3 emissions from indirect sources calculated seperately, as noted on respective worksheets, using Table III-3 from above-noted USEPA reference.

TABLE 9A-41 (Revised 5-21-08): EMISSIONS CALCULATIONS - CONSTRUCTION PHASE---- Construction years 2009-2011, AQCR 115
LNG Terminal Dredging Activities
Onshore Start-up Construction Activities

Construction period, 180 days entirely in 2009.
AQCR- 115

Equipment	no. of units	Bhp	Load factor	Emission Factors Basis
Cranes	1	400	50%	EPA Tier 1
Backhoes	1	85	50%	EPA Tier 1
Dozers	2	185	50%	EPA Tier 1
Excavators	2	225	50%	EPA Tier 1
Loaders	1	300	50%	EPA Tier 1
Trucks	2	355	50%	EPA Tier 1
Graders	1	215	50%	EPA Tier 1
Skid Steers	1	80	50%	EPA Tier 1
BSFC, lb/hp-hr (>100 hp)	0.367			
BSFC, lb/hp-hr (<100hp)	0.408			
% Sulfur Fuel	0.05	before June 1, 2010		
	0.0015	after June 1, 2010		
Engine Type	Diesel compression ignition			
Avg. Load Factor	0.5			
Operating hrs/day	12			

	1	Cranes			1	Backhoes			2	Dozers			2	Excavators		
	400	Bhp, each unit			85	Bhp, each unit			185	Bhp, each unit			225	Bhp, each unit		
Pollutant	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**
PM	0.33	1.00	0.037	0.037	0.33	1.97	0.015	0.015	0.33	1.23	0.021	0.042	0.33	1.23	0.025	0.051
NO_X	6.9	1.00	0.767	0.767	6.9	1.10	0.179	0.179	6.9	0.95	0.337	0.674	6.9	0.95	0.410	0.819
SO_2	0.16	1.00	0.018	0.018	0.16	1.18	0.005	0.005	0.16	1.01	0.008	0.017	0.16	1.01	0.010	0.020
CO	2.7	1.00	0.300	0.300	2.7	2.57	0.164	0.164	2.7	1.53	0.212	0.425	2.7	1.53	0.258	0.516
HC	0.68	1.00	0.076	0.076	0.68	2.29	0.037	0.037	0.68	1.05	0.037	0.073	0.68	1.05	0.045	0.089

	1	Loaders			2	Trucks			1	Graders			1	Skid Steers		
	300	Bhp, each unit			355	Bhp, each unit			215	Bhp, each unit			80	Bhp, each unit		
Pollutant	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**
PM	0.33	1.97	0.054	0.054	0.33	1.23	0.040	0.080	0.33	1.23	0.024	0.024	0.33	1.97	0.014	0.014
NO_X	6.9	1.10	0.633	0.633	6.9	0.95	0.646	1.293	6.9	0.95	0.391	0.391	6.9	1.1	0.169	0.169
SO_2	0.16	1.18	0.016	0.016	0.16	1.01	0.016	0.032	0.16	1.01	0.010	0.010	0.16	1.18	0.004	0.004
CO	2.7	2.57	0.578	0.578	2.7	1.53	0.407	0.815	2.7	1.53	0.247	0.247	2.7	2.57	0.154	0.154
HC	0.68	2.29	0.130	0.130	0.68	1.05	0.070	0.141	0.68	1.05	0.043	0.043	0.68	2.29	0.035	0.035

	Total g/sec	**Daily Avg. Load Fact.**	**Total Tons per day @ 12 hr/day**	**Total TPY, 2009 @ 180 day constr sched**
Pollutant				
PM *	0.317	0.5	0.01	1.4
NO_X	4.924	0.5	0.12	21.1
SO_2	0.122	0.5	0.00	0.5
CO	3.199	0.5	0.08	13.7
HC	0.623	0.5	0.01	2.7

Notes:
1. Pre-EPA Tier 1 based emission factors obtained from "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling --Compression-Ignition", Report No. NR-009C, revised April 2004, US EPA Office of Mobile Sources. Steady-state emission factors for CI engines obtained from Table C1, assuming 1988-95 model year, pre-Tier 1 engines. NOX emission factors for equipment meeting Tier 1 standards obtained from 40 CFR 89.112, Table 1 for applicable power rating and Tier 1 model year. SO2 emission factor based on brake-specific fuel consumption (BSFC) given in Table C1 and assuming default sulfur content (0.05%) required for the construction year in nonroad diesel fuel. PM emission factor in Table C1 adjusted for fuel sulfur content according to the equation given in Appendix C, page C5 of above-referenced EPA document [PMBase = PM + BSFC*A*)0.0033 - fuel sulfur)]. Emissions factors for equipment retrofit w/ selective catalytic reduction (SCR) + diesel particulate filters (DPF) assume 75% control of PM and 85% control of NOX from pre-Tier 1 baseline emissions factors.
2. In-use adjustment factors obtained from "Exhaust Emission Factors for Nonroad Engine Modeling --Compression-Ignition", Report No. NR-009C, revised April 2004, US EPA Office of Mobile Sources, Table A3, Transient Adjustment Factors.
3. SO_2 emission factor based on 0.05% (pre-June 1, 2010) diesel sulfur content.
4. Number, Bhp and load factors for construction equipment diesel engines estimated from data provided by Clean Earth Technologies, Inc..
5. Period of Construction Activites Used for Calculation: Dredging Start-up Activities occur entirely during 2009 year.
* PM, PM10 and PM2.5 are conservatively estimated to be equivalent for combustion sources.

TABLE 9A-41a (Revised 5-22-08): EMISSIONS CALCULATIONS - CONSTRUCTION PHASE---- Construction years 2009-2011, AQCR 115

LNG Terminal Dredging Activities

Construction period, 180 days entirely in 2009.

Onshore Start-up Construction Activities

AQCR- 115

Fugitive Particulate Matter Emissions

Fugitive PM Emissions from Construction Vehicle Movement on Unpaved Roads at Construction Sites

EPA Unpaved Roads particulate emissions factor equation and assumptions for empirical constants:

	Reference	Value for PM10	Value for PM2.5
s = surface silt content (%)	USEPA AP-42 Table 13.2.2-1 mean value for construction sites	8.5	8.5
W = mean vehicle weight (tons)	See table below	See table below	See table below
k (lb/VMT) empirical constant	USEPA AP-42, Table 13.2.2-2	1.5	0.15
a empirical constant	USEPA AP-42, Table 13.2.2-2	0.9	0.9
b empirical constant	USEPA AP-42, Table 13.2.2-2	0.45	0.45
P = number of days in a year w/ at least 0.01 in. precip.	USEPA AP-42 Figure 13.2.2-1	140	140
E (lb/VMT) $= k (s/12)^a (W/3)^b$ = size-specific emission factor	USEPA AP-42, Section 13.2.2-4, equation (1a)	See table below	See table below
E_{ext} (lb/VMT) $= E [(365-P)/365]$ = annual size-specific emission factor extrapolated for natural mitigation (precipitation)	USEPA AP-42, Section 13.2.2-4, equation (2)	See table below	See table below

Equipment Description	Onsite Vehicular Traffic (Veh./Day)	Avg. Daily VMT/day Unpaved Roads	Estimated Vehicle Weight (tons)	Number of Constr. Months	Number of Constr. Days[3]	VMT/const period	PM10 E_{ext} (lb/VMT)	PM2.5 E_{ext} (lb/VMT)	Total PM10 (TPCP)	Total PM2.5 (TPCP)
Cranes	1	0.1	60	9	180	18	2.610	0.261	0.023	0.002
Backhoes	1	0.5	3.25	9	180	90	0.703	0.070	0.032	0.003
Dozers	2	5	22.5	9	180	1800	1.679	0.168	1.511	0.151

Excavators	2	2	20	9	180	720	1.592	0.159	0.573	0.057
Loaders	1	6	32	9	180	1080	1.967	0.197	1.062	0.106
Trucks	2	30	34	9	180	10800	2.021	0.202	10.916	1.092
Graders	1	5	12	9	180	900	1.265	0.127	0.569	0.057
Skid Steers	1	5	3	9	180	900	0.678	0.068	0.305	0.031
Total									**14.99**	**1.50**

Fugitive PM Emissions from Materials Handling Activities at Construction Sites

Construction Activity	Avg. Daily Matl. Handling Rate (TPD)	Number of Constr. Days	TSP (lb/ton)	PM10 Scaling Factor	PM2.5 Scaling Factor	PM10 (lb/ton)[2]	PM2.5 (lb/ton)	Total PM10 (TPCP)	Total PM2.5 (TPCP)	USEPA AP-42 Emission Factor Reference
Topsoil removal	500	180	0.058	0.75	0.105	0.0435	0.0061	1.9575	0.2741	Table 11.9-4 - topsoil removal by scraper
Excavated material unloading to storage piles or trucks	500	180	0.037	0.75	0.105	0.0278	0.0039	1.2488	0.1748	Table 11.9-4 - truck loading
Total								3.2063	0.4489	

	Total Fugitive PM Emissions
PM10 (TPY)	18.2
PM2.5 (TPY)	1.95

Notes:
Blank cells indicate values not applicable, e.g., no movement of construction equipment or material handling involved.

1. Emissions occur entirely in calendar years 2009 in AQCR 115 (Baltimore).
2. PM10 emission factor is conservatively high as PM10 scaling factor in AP-42 Table 11.9-1 is applied here to TSP, rather than PM15 emission factor.
3. 20 day/month construction schedule.

TABLE 9A-42 (Revised 5-21-08): EMISSIONS CALCULATIONS - CONSTRUCTION PHASE---- Construction years 2009-2011, AQCR 115
LNG Terminal Dredging Activities
Onshore Processing and Stockpiling Activities

TPCP= Tons per construction period, March 2009 - May 2011 (27 months)
AQCR- 115

Equipment	no. of units	Bhp	Load factor	Emission Factors Basis
Water Trucks	2	300	50%	Pre-EPA Tier 1
Backhoes	2	85	50%	EPA Tier 1
Dozers	2	185	50%	EPA Tier 1
Excavators	6	225	50%	EPA Tier 1
Loaders	4	300	50%	EPA Tier 1
Trucks	6	355	50%	EPA Tier 1
Sweepers	1	200	50%	EPA Tier 1
Skid Steers	2	80	50%	EPA Tier 1
BSFC, lb/hp-hr (>100 hp)	0.367			
BSFC, lb/hp-hr (<100hp)	0.408			
% Sulfur Fuel	0.05	before June 1, 2010		
	0.0015	after June 1, 2010		
Engine Type	Diesel compression ignition			
Avg. Load Factor	0.5			
Operating hrs/day	12			

	2	**Water Trucks**			**2**	**Backhoes**			**2**	**Dozers**			**6**	**Excavators**		
	300	**Bhp, each unit**			**85**	**Bhp, each unit**			**185**	**Bhp, each unit**			**225**	**Bhp, each unit**		
Pollutant	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**
PM	0.33	1.00	0.028	0.055	0.33	1.97	0.015	0.031	0.33	1.23	0.021	0.042	0.33	1.23	0.025	0.152
NO_X	8.38	1.00	0.698	1.397	6.9	1.10	0.179	0.358	6.9	0.95	0.337	0.674	6.9	0.95	0.410	2.458
SO_2	0.16	1.00	0.014	0.027	0.16	1.18	0.005	0.009	0.16	1.01	0.008	0.017	0.16	1.01	0.010	0.061
CO	2.7	1.00	0.225	0.450	2.7	2.57	0.164	0.328	2.7	1.53	0.212	0.425	2.7	1.53	0.258	1.549
HC	0.68	1.00	0.057	0.113	0.68	2.29	0.037	0.074	0.68	1.05	0.037	0.073	0.68	1.05	0.045	0.268

	4	**Loaders**			**6**	**Trucks**			**1**	**Sweepers**			**2**	**Skid Steers**		
	300	**Bhp, each unit**			**355**	**Bhp, each unit**			**200**	**Bhp, each unit**			**80**	**Bhp, each unit**		
Pollutant	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**	**Em. Factor[1] g/Bhp-hr**	**In-use Adj. Factor[2]**	**Ea. Unit g/sec**	**Total g/sec**
PM	0.33	1.97	0.054	0.217	0.33	1.23	0.040	0.240	0.33	1.23	0.023	0.023	0.33	1.97	0.014	0.029
NO_X	6.9	1.10	0.633	2.530	6.9	0.95	0.646	3.878	6.9	0.95	0.364	0.364	6.9	1.1	0.169	0.337
SO_2	0.16	1.18	0.016	0.064	0.16	1.01	0.016	0.097	0.16	1.01	0.009	0.009	0.16	1.18	0.004	0.009
CO	2.7	2.57	0.578	2.313	2.7	1.53	0.407	2.444	2.7	1.53	0.230	0.230	2.7	2.57	0.154	0.308
HC	0.68	2.29	0.130	0.519	0.68	1.05	0.070	0.422	0.68	1.05	0.040	0.040	0.68	2.29	0.035	0.069

Pollutant	**Total g/sec**	**Daily Avg. Load Fact.**	**Total Tons per day @ 12 hr/day**	**Total TPY @ 276 day/12-month constr sched**
PM *	0.788	0.5	0.02	5.2
NO_X	11.997	0.5	0.29	78.8
SO_2	0.293	0.5	0.01	1.9
CO	8.046	0.5	0.19	52.9
HC	1.578	0.5	0.04	10.4

Notes:
1. Pre-EPA Tier 1 based emission factors obtained from "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling --Compression-Ignition", Report No. NR-009C, revised April 2004, US EPA Office of Mobile Sources. Steady-state emission factors for CI engines obtained from Table C1, assuming 1988-95 model year, pre-Tier 1 engines. NOX emission factors for equipment meeting Tier 1 standards obtained from 40 CFR 89.112, Table 1 for applicable power rating and Tier 1 model year. SO2 emission factor based on brake-specific fuel consumption (BSFC) given in Table C1 and assuming default sulfur content (0.05%) required for the construction year in nonroad diesel fuel. PM emission factor in Table C1 adjusted for fuel sulfur content according to the equation given in Appendix C, page C5 of above-referenced EPA document [PMBase = PM + BSFC*A*)0.0033 - fuel sulfur)]. Emissions factors for equipment retrofit w/ selective catalytic reduction (SCR) + diesel particulate filters (DPF) assume 75% control of PM and 85% control of NOX from pre-Tier 1 baseline emissions factors.
2. In-use adjustment factors obtained from "Exhaust Emission Factors for Nonroad Engine Modeling --Compression-Ignition", Report No. NR-009C, revised April 2004, US EPA Office of Mobile Sources, Table A3, Transient Adjustment Factors.
3. SO_2 emission factor based on 0.05% (pre-June 1, 2010) diesel sulfur content.
4. Number, Bhp and load factors for construction equipment diesel engines estimated from data provided by Clean Earth Technologies, Inc..
5. Period of Construction Activites Used for Calculation: Dredging Process Activities occur March 2009-May 2011 (27 months), 23 days per month.
* PM, PM10 and PM2.5 are conservatively estimated to be equivalent for combustion sources.

TABLE 9A-42a (Revised 5-22-08): EMISSIONS CALCULATIONS - CONSTRUCTION PHASE---- Construction years 2009-2011, AQCR 115

LNG Terminal Dredging Activities

Onshore Processing and Stockpiling Activities

Fugitive Particulate Matter Emissions

TPCP= Tons per construction period, March 2009 - May 2011 (27 months)

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Fugitive PM Emissions from Construction Vehicle Movement on Unpaved Roads at Construction Sites

EPA Unpaved Roads particulate emissions factor equation and assumptions for empirical constants:

	Reference	Value for PM10	Value for PM2.5
s = surface silt content (%)	USEPA AP-42 Table 13.2.2-1 mean value for construction sites	8.5	8.5
W = mean vehicle weight (tons)	See table below	See table below	See table below
k (lb/VMT) empirical constant	USEPA AP-42, Table 13.2.2-2	1.5	0.15
a empirical constant	USEPA AP-42, Table 13.2.2-2	0.9	0.9
b empirical constant	USEPA AP-42, Table 13.2.2-2	0.45	0.45
P = number of days in a year w/ at least 0.01 in. precip.	USEPA AP-42 Figure 13.2.2-1	140	140
E (lb/VMT) $= k (s/12)^a(W/3)^b$ = size-specific emission factor	USEPA AP-42, Section 13.2.2-4, equation (1a)	See table below	See table below
E_{ext} (lb/VMT) = E [(365-P)/365] = annual size-specific emission factor extrapolated for natural mitigation (precipitation)	USEPA AP-42, Section 13.2.2-4, equation (2)	See table below	See table below

Equipment Description	Onsite Vehicular Traffic (Veh./Day)	Avg. Daily VMT/day Unpaved Roads	Estimated Vehicle Weight (tons)	Number of Constr. Months	Number of Constr. Days[3]	VMT/const period	PM10 E_{ext} (lb/VMT)	PM2.5 E_{ext} (lb/VMT)	Total PM10 (TPCP)	Total PM2.5 (TPCP)
Water Trucks	2	2	25	12	276	1104	1.760	0.176	0.972	0.097
Backhoes	2	0.5	3.25	12	276	276	0.703	0.070	0.097	0.010
Dozers	2	5	22	12	276	2760	1.662	0.166	2.293	0.229

Excavators	6	2	20	12	276	3312	1.592	0.159	2.636	0.264
Loaders	4	6	32	12	276	6624	1.967	0.197	6.515	0.651
Trucks	6	30	34	12	276	49680	2.021	0.202	50.212	5.021
Sweepers	1	20	12	12	276	5520	1.265	0.127	3.492	0.349
Skid Steers	2	5	3	12	276	2760	0.678	0.068	0.936	0.094
Total									**67.15**	**6.72**

Fugitive PM Emissions from Materials Handling Activities at Construction Sites

Construction Activity	Avg. Daily Matl. Handling Rate (TPD)	Number of Constr. Days	TSP (lb/ton)	PM10 Scaling Factor	PM2.5 Scaling Factor	PM10 (lb/ton)[2]	PM2.5 (lb/ton)	Total PM10 (TPCP)	Total PM2.5 (TPCP)	USEPA AP-42 Emission Factor Reference
Topsoil removal	500	276	0.058	0.75	0.105	0.0435	0.0061	3.0015	0.4202	Table 11.9-4 - topsoil removal by scraper
Excavated material unloading to storage piles or trucks	500	276	0.037	0.75	0.105	0.0278	0.0039	1.9148	0.2681	Table 11.9-4 - truck loading
Total								4.9163	0.6883	

	Total Fugitive PM Emissions/yr	2009	2010	2011
PM10 (TPY)	72.1	60.06	72.07	30.03
PM2.5 (TPY)	7.40	6.17	7.40	3.08

Notes:
Blank cells indicate values not applicable, e.g., no movement of construction equipment or material handling involved.

1. Dredging Process Activities occur March 2009-May 2011 (27 months) in AQCR 115 (Baltimore).
2. PM10 emission factor is conservatively high as PM10 scaling factor in AP-42 Table 11.9-1 is applied here to TSP, rather than PM15 emission factor.
3. 23 day/month construction schedule.

TABLE 9A-43: EMISSIONS CALCULATIONS - CONSTRUCTION PHASE---- Construction years 2009-2011, AQCR 115
LNG Terminal Dredging Activities
Offshore - Dredging and Marine Vessel Emissions

Description	**Off-shore Start-Up Const. Equip.**
No. of Units	1 Dredge, 1 Tug, 1 Work/Survey boat, 1 Crew boat, 1 Inspecting/Contractor
BSFC, lb/hp-hr	0.367
% S in Fuel	0.05
Engine Type	Diesel compression ignition
# Operating Days	1
Operating hrs/day	12

	1 Dredge					**1 Tug**					**1 Survey/Work Boat**				
	1800 Bhp, each unit					**2400 Bhp, each unit**					**250 Bhp, each unit**				
Pollutant	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**
PM	1	0.261	16113.6	4206	4206	0.5	0.272	21485	5839	5839	0.5	0.272	2238	608	608
NO_X	1	10.575	16113.6	170403	170403	0.5	10.805	21485	232134	232134	0.5	10.805	2238	24181	24181
SO_2	1	0.16	16113.6	2578	2578	0.5	0.16	21485	3438	3438	0.16	0.642	2238	1437	1437
CO	1	0.0059	16113.6	95	95	0.5	0.017	21485	359	359	0.5	0.017	2238	37	37
HC	1	0.0067	16113.6	108	108	0.5	0.019	21485	407	407	0.5	0.019	2238	42	42

	1 Crew Boat					**1 Inspecting/Contracting Vessel**				
	200 Bhp, each unit					**684 Bhp, each unit**				
Pollutant	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**	**Factor based on Fractional Load**	**Emissions Factor, g/kw-hr**	**kwhrs/day**	**Ea. Unit g/day**	**Total g/day**
PM	0.5	0.272	1790	487	487	0.5	0.272	6123	1664	1664
NO_X	0.5	10.805	1790	19344	19344	0.5	10.805	6123	66158	66158
SO_2	0.5	0.160	1790	286	286	0.5	0.160	6123	980	980
CO	0.5	0.017	1790	30	30	0.5	0.017	6123	102	102
HC	0.5	0.019	1790	34	34	0.5	0.019	6123	116	116

	Total g/day	**Total Tons per day @ 12 hr/day**	**Total TPY @ 276 day/12-month constr sched**
Pollutant			
PM	12804	0.01	3.90
NO_X	512220	0.56	155.83
SO_2	8719	0.01	2.65
CO	623	0.001	0.19
HC	707	0.001	0.22

Notes:
1. Emission factors from "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data" EPA guidance report, February 2000, Office of Air and radiation.
2. Equipment list provided by Han Padron, Inc. and Clean Earth Technologies, Inc.

TABLE 9A-44 (Revised 5-22-08): EMISSIONS CALCULATIONS - CONSTRUCTION PHASE---- Construction years 2009-2011, AQCR 115
LNG Terminal Dredging Activities
Indirect Emissions from Haul Trucks and Workers Commuting

Vehicle Type	Vehicle Trips per Day	Days per Year	Round Trip Miles	PM10/PM2.5* Emissions Factor (g/mile)	PM10/PM2.5* Tons/day	PM10/PM2.5* Tons/Year	NH3 Emissions Factor (g/mile)	NH3 Tons/day	NH3 Tons/Year	NO_X Emissions Factor (g/mile)	NO_X Tons/day	NO_X Tons/Year	VOC Emissions Factor (g/mile)	VOC Tons/day	VOC Tons/Year	CO Emissions Factor (g/mile)	CO Tons/day	CO Tons/Year
Spoils Haul Trucks (HDDV)	218	276	396	0.3	0.0285	7.88	0.02704	0.0026	0.71	12.69	1.2076	333.29	1.56	0.1484	40.97	6.87	0.6537	180.43
Additive Supply Trucks (HDDV)	27	276	20	0.3	0.0002	0.05	0.02704	0.0000	0.004	12.69	0.0076	2.08	1.56	0.0009	0.26	6.87	0.0041	1.13
Workers Commuting (LDGV)	15	276	30	0.02	0.0000	0.003	0.01513	0.0000	0.002	1.86	0.0009	0.25	1.22	0.0006	0.17	14.72	0.0073	2.02
Workers Commuting (LDGT)	15	276	30	0.02	0.0000	0.003	0.01513	0.0000	0.002	2.31	0.0011	0.32	1.82	0.0009	0.25	22.24	0.0110	3.04
Total					0.0287	7.9339		0.0026	0.7188		1.2172	335.94		0.1509	41.64		0.6762	186.62
Total minus dredge haul trucks						0.055			0.009			2.66			0.67			6.19

Notes:

Emission factors for NOX, VOC and CO obtained from USEPA AP-42, Appendix J (1998), with the following assumptions - 35 mph, 1995 model year, 50% cold start and 50% stabilized operation, low altitude, 100F ambient temperature.

Total days of operation = approximately 12 months x 23 days/month = 276 days @ 2years = 552 Days

Emission factors for Ammonia obtained from Table III-3 of USEPA report, "Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources", April 2004.

* PM, PM10 and PM2.5 are conservatively estimated to be equivalent for combustion sources

	In MD	In VA	In DC	Total
Total dredge haul truck one-way transit distance (km)	57	245	16	318
miles	35	152	10	198

	Baltimore & Anne Arundel Counties, MD	(Wash., DC-MD-VA AQCR) Prince George Co., MD	Wash. DC	Fairfax and Prince William Cos., VA	Attainment areas in VA	
Dredge Haul Truck One-way Distances by Nonattainment Area (miles)	23	12	10	28	124	197.48
Fraction of total distance	0.12	0.06	0.05	0.14	0.63	1.00
Fraction of total distance in MD	0.65	0.34				
Fraction of total distance in VA				0.18	0.82	

	TPY					total
$PM_{10}/PM_{2.5}$	0.92	0.48	0.40	1.11	4.96	7.87
NO_X	38.78	20.44	17.08	47.16	209.61	333.08
SO_2						0.00
CO	20.99	11.06	9.25	25.53	113.48	180.32
VOC	4.77	2.51	2.10	5.80	25.77	40.95
NH3	0.08	0.04	0.04	0.10	0.45	0.71

2009 fraction of year = 0.83

	TPY					total
$PM_{10}/PM_{2.5}$	0.76	0.40	0.34	0.93	4.13	6.56
NO_X	32.32	17.03	14.24	39.30	174.68	277.57
SO_2	0.00	0.00	0.00	0.00	0.00	0.00
CO	17.49	9.22	7.71	21.28	94.57	150.27
VOC	3.97	2.09	1.75	4.83	21.47	34.12
NH3	0.07	0.04	0.03	0.08	0.37	0.59

2010 fraction of year = 1.00

	TPY					total
$PM_{10}/PM_{2.5}$	0.92	0.48	0.40	1.11	4.96	7.87
NO_X	38.78	20.44	17.08	47.16	209.61	333.08
SO_2	0.00	0.00	0.00	0.00	0.00	0.00
CO	20.99	11.06	9.25	25.53	113.48	180.32
VOC	4.77	2.51	2.10	5.80	25.77	40.95
NH3	0.08	0.04	0.04	0.10	0.45	0.71

2011 fraction of year = 0.42

	TPY					total
$PM_{10}/PM_{2.5}$	0.38	0.20	0.17	0.46	2.06	3.28
NO_X	16.16	8.52	7.12	19.65	87.34	138.78
SO_2	0.00	0.00	0.00	0.00	0.00	0.00
CO	8.75	4.61	3.85	10.64	47.28	75.13
VOC	1.99	1.05	0.88	2.42	10.74	17.06
NH3	0.03	0.02	0.02	0.04	0.19	0.30

TABLE 9A-45: EMISSIONS CALCULATIONS (Revised 5-22-08) - CONSTRUCTION PHASE---- Construction years 2009-2011, AQCR
LNG Terminal Dredging Activities
Summary of Total Emissions from Dredging Activities

Total Tons/Year During Construction Period								
Pollutant	Start-Up Construction - Total Tons/Yr During Construction Period	Onshore Construction - Total Tons/Yr During Construction Period	Offshore Construction - Total Tons/Yr During Construction Period	Indirect Emissions from Commuting Construction Workers and Haul Trucks	Total Tons/Yr During Construction Period	Tons Emitted 2009	Tons Emitted 2010	Tons Emitted 2011
PM10	19.56	77.25	3.90	7.93	108.63	93.79	89.08	37.11
PM2.5	3.31	12.58	3.90	7.93	27.72	23.65	24.41	10.17
NO_X	21.10	78.84	155.83	335.94	591.72	496.62	570.61	237.76
SO_2	0.52	1.92	2.65		5.10	4.34	4.57	1.91
CO	13.71	52.88	0.19	186.62	253.40	213.45	239.69	99.87
VOC	2.67	10.37	0.22	41.64	54.90	46.20	52.23	21.76
NH3**	0.26	1.03	0.05	0.72	2.06	1.76	1.80	0.75

Total Tons/Year During Construction Period - AQCR 115								
Pollutant	Start-Up Construction - Total Tons/Yr During Construction Period	Onshore Construction - Total Tons/Yr During Construction Period	Offshore Construction - Total Tons/Yr During Construction Period	Indirect Emissions from Commuting Construction Workers and Haul Trucks	Total Tons/Yr During Construction Period	Tons Emitted 2009	Tons Emitted 2010	Tons Emitted 2011
PM10	19.56	77.25	3.90	0.97	101.67	87.99	82.11	34.21
PM2.5	3.31	12.58	3.90	0.97	20.76	17.85	17.45	7.27
NO_X	21.10	78.84	155.83	41.43	297.21	251.19	276.10	115.04
SO_2	0.52	1.92	2.65		5.10	4.34	4.57	1.91
CO	13.71	52.88	0.19	27.18	93.96	80.58	80.25	33.44
VOC	2.67	10.37	0.22	5.44	18.70	16.03	16.03	6.68
NH3**	0.26	1.03	0.05	0.09	1.43	1.24	1.17	0.49

** NH3 emissions from nonroad diesel engines calculated using proportionality of emissions factors, PM emissions * (.0044/.33).
0.0044 g/Bhp-hr derived from 1.83E-04 lb NH3/gal / (7 lb/gal diesel) x 0.367 lb diesel/Bhp-hr x 454 g/lb)
1.83E-04 lb/gal emission factor obtained from Table III-6 of USEPA report, "Estimating Ammonia Emissions from Anthropogenice Nonagricultural Sources", April 2004.
NH3 emissions from indirect sources calculated seperately, as noted on respective worksheets, using Table III-3 from above-noted USEPA reference.

AES SP DREDGING em calcs 06-03-08 Dredg summ (2) 6/4/2008