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TECHNICAL MEMORANDUM REGARDING HADNOT POINT CONSTRUCTION AREA RISK EVALUATION UPDATE OPERABLE UNIT 1 (OU 1) SITE 78 MCB CAMP LEJEUNE NC

5/9/2012

CH2M HILL

Hadnot Point Construction Area Risk Evaluation Update, Operable Unit 1 (Site 78), Marine Corps Installations East-Marine Corps Base Camp Lejeune, North Carolina

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DATE: May 9, 2012

1 Introduction

The purpose of this technical memorandum is to summarize the results of additional human health risk assessment (HHRA) and ecological risk assessment (ERA) for the Hadnot Point Construction Area (HPCA) located within the Hadnot Point Industrial Area (HPIA) of Operable Unit (OU) 1, Site 78, during the completion of a Focused Preliminary Assessment/Site Inspection (PA/SI) for the HPCA, Post Office Intersection Area, and Fitness Center (CH2M HILL, 2010). The site location is shown on **Figure 1**.

The HPCA encompasses approximately 109 acres and is bounded by Louis Road to the southeast, Ash Street to the northeast, East Road to the northwest and athletic fields to the southwest. Much of the HPCA is paved (roadways, parking lots, loading dock areas, and storage lots). There are two woodlots, covering several acres each, and areas with maintained landscapes. A drainage feature is located in the western portion of the HPCA. The feature conveys water from portions of the HPCA (and areas to the west and north) to a culvert at Louis Road and eventually to the New River.

Potentially unacceptable risks identified in the PA/SI included future lifetime resident exposure to polycyclic aromatic hydrocarbons (PAHs) and metals in surface soil and ecological exposure to metals in surface water and sediment located in the drainage feature. Additional human health and ecological risk evaluation summarized herein was conducted to further refine risks and determine if additional actions are appropriate.

2 Human Health Risk Assessment Update

An HHRA was completed during the PA/SI (CH2M HILL, 2010) and it concluded that exposure to surface soil could potentially pose an unacceptable risk to future lifetime residents based on the detected concentrations of PAHs and metals in exposure units (EUs) 4, 7, and 8 within the HPCA (**Figure 2**). These potentially unacceptable risks are based on a reasonable maximum exposure (RME), assuming direct contact with the highest concentrations. The central tendency exposure (CTE), based on more realistic exposure duration, soil ingestion rates, and average soil concentrations, are within the United States Environmental Protection Agency's (USEPA's) acceptable range. Based on this and the fact that future lifetime residents (assumes 30 years of living at this location) are not likely within the HPIA or Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ), further evaluation was deemed appropriate to evaluate additional lines of evidence.

The location of the HPCA is within the HPIA and OU 1, which was previously investigated and evaluated; therefore, current concentrations (CH2M HILL, 2010) were compared to those detected during the OU 1 Remedial Investigation (RI) (Baker, 1994). Based on this comparison, it appears that concentrations of PAHs and metals are on the same order of magnitude, with the exception of one sample from EU 7 (MR08-SS325) collected during the PA/SI, which contained anomalously high PAHs (**Table 1**).

TABLE 1
Data Comparison

Chemicals	Average Concentration mg/kg (RI, 1994)	Average Concentration* mg/kg (PA/SI, 2010)	Max Concentration mg/kg (RI, 1994)	Max Concentration* mg/kg (PA/SI, 2010)	MR08-SS325 mg/kg (PA/SI, 2010)
PAHs					
Benzo(a)anthracene	0.42	0.121	2.9	5.5	25
Benzo(a)pyrene	0.33	0.130	2.0	3.7	26
Benzo(b)fluoranthene	0.35	0.207	2.7	6.1	32
Benzo(g,h,i)perylene	0.15	0.101	0.33	2.6	19
Benzo(k)fluoranthene	0.31	0.121	1.4	3.8	26
Dibenz(a,h)anthracene	0.12	0.039	0.46	0.95	9.4
Indeno(1,2,3-cd)pyrene	0.16	0.10	0.40	2.7	19
Metals					
Arsenic	1.18	1.83	2.80	13.6	1.3
Chromium	14.1	7.5	74.6	147	15

Notes:
mg/kg – milligrams per kilogram
*PAHs detected in sample MR08-SS325 were excluded from average and maximum calculations as concentrations are anomalously high.

During the RI, surface soil samples were collected from select buildings and focused on contaminants identified in previous investigations. The soil samples were not intended to be used in a full site evaluation. Based on the potential bias from the limited nature of the surface soil investigation, potential risks from exposure to PAHs and metals in soil were not quantified in the RI.

The similar concentrations detected in soil samples collected from different locations within the HPIA approximately 15 years apart suggest that the PAHs and metals detected are ubiquitous and not necessarily linked to a specific source area. Arsenic, chromium, and PAHs similar to those detected in the surface soil from the HPCA are also typically found in fly ash. Therefore, there is a potential that the presence of PAHs and metals in the surface soil could be linked to fly ash from the coal-fired power plant in the northwest portion of Site 78 (**Figure 1**).

Based on the re-evaluation of potential risks from exposure to surface soil, the following conclusions are made:

- Concentrations of PAHs and metals in surface soil appear to be ubiquitous in nature and are present across the site
- A specific source of PAHs or metals in surface soil has not been identified
- There have been no PAHs or metals identified as an issue in underlying subsurface soil or groundwater
- Potential risks to future lifetime residents based on CTE are within USEPA's acceptable ranges

Based on these conclusions, a potentially unacceptable risk to future lifetime residents is unlikely from exposure to surface soil located in the HPCA.

3 Ecological Risk Assessment Update

An ecological risk screening (ERS) was completed as part of the PA/SI (CH2M HILL, 2010). The ERS evaluated the potential for ecological risks associated with exposure to surface soil, subsurface soil, surface water, sediment, and groundwater. The results of the screening indicated that no significant risks were anticipated for ecological receptors exposed to subsurface soil and groundwater. However, based on the detected concentrations of PAHs and metals in surface soil, surface water, and sediment, the ERS recommended further assessment. Constituents, by media, that warranted further consideration were as follows:

- Surface soil—PAHs, antimony, cadmium, lead, mercury, silver, and zinc
- Surface water—barium, cadmium, chromium, copper, lead, selenium, and zinc
- Sediment—PAHs, antimony, arsenic, barium, cadmium, copper, lead, and selenium

Because the ERS identified potential risk associated with these media and constituents, the formal USEPA 8-step ERA process was conducted to further evaluate the data and refine the risk assessment (**Attachment A**). As part of the ERA, a field survey was conducted to evaluate the habitat in the drainage (**Figure 3**). The following subsections present the results of the field survey and a summary of the ERA results.

Drainage Survey

A field survey of the drainage was conducted in October 2011. The drainage was evaluated at 11 survey points, at Louis Road, 50 feet upgradient of Louis Road, 100 feet upgradient of Louis Road, and at 100-foot intervals upgradient thereafter until the last survey point, located 900 feet upgradient. The drainage characteristics are listed as follows.

- Four discharges (assumed to be stormwater)
- Upgradient 1/3 of the drainage appears to be man made
- Evidence of drainage bed excavation at 6 of 11 points (including native section)
- Excavation has created deep channel (that is, top of bank to bottom of bed is deep, with a relatively small bed width)
- Majority of length has steep, vertical, or undercut banks
- Water was stagnant; average depth less than 6 inches (dry over much of the length of the summer)
- Limited wildlife observations (raccoon tracks, one frog, no bird nests observed)
- No fish or aquatic invertebrates observed
- Sediment is silty sand to silty clay
- Sediment depth ranged from 1 to 34 inches (deepest in downgradient portion)
- Water color and sediment typical of areas subject to runoff
- Debris and trash at 10 of 11 locations

Based on the drainage survey, the drainage supports limited wildlife use and is poor aquatic habitat. The key function of the drainage is stormwater management. During a storm, water likely backs up at Louis Road. The drainage channel serves as a detention basin. Suspended material falls out or is filtered by vegetation, as evidenced by the deep sediment near Louis Road. The water flows into a culvert at Louis Road and daylights into a wooded area several hundred feet downgradient (**Figure 3**). Eventually, the water reaches the New River. Viewed in a broader landscape context, the onsite portion of the drainage serves to protect the downgradient water quality of less disturbed areas that have much higher ecological value.

Risk Characterization Summary

Risk to lower trophic level receptors exposed to surface soils is considered low and driven by only a few samples. Using the exposure point concentration (EPC), there were no hazard quotients (HQs) above 1 for wildlife. Overall, soil is not expected to pose a significant risk to receptor populations.

Potential risk was predicted for lower trophic level receptors exposed to some analytes in surface water and sediment in the drainage. However, it is poor aquatic habitat, regardless of the exceedances of some benchmarks for surface water and sediment. The drainage has been altered through excavation and the flow is intermittent. The water is likely shallow and stagnant over a significant portion of the year. When it does rain, the drainage is subject to high flows. As previously discussed, the major function of the drainage is stormwater management. Because of the limited quality, the use is limited, and therefore risk to ecological receptor populations is considered low.

Selenium, which has no defined source at the site, was the only analyte to have an HQ greater than 1 based on the refined food chain modeling, with the majority of predicted risk posed by selenium concentrations in sediment. While this risk to insectivorous birds was identified, the results of the drainage survey suggest population level impacts are unlikely. The spatial area covered by the drainage is relatively small and the aquatic habitat is poor (that is, no benthic invertebrates were observed). Because the prey base associated with the sediment is limited, risk to insectivorous birds is also limited. The difference between the onsite drainage and downgradient stretch is further confirmation that the drainage serves to retain contaminants in stormwater runoff.

Conclusions and Recommendations

Concentrations of metals and PAHs in surface soil appear to be ubiquitous in nature and are present across the HPCA with no identified source.

Potential risks to future lifetime residents based on CTE are within USEPA's acceptable ranges.

Overall, risks to ecological receptors from exposure to surface soil, sediment, and surface water at the HPCA are considered low. While some elevated concentrations exist within the drainage channel, the physical characteristics limit the potential for ecological exposure. In addition, the stormwater management functions provided by the drainage are likely protecting downgradient water quality in areas with higher ecological value. The conclusion of the ERA is that significant impacts to receptor populations are unlikely.

Based on these conclusions, no further action is recommended in the HPCA.

4 References

Baker Environmental, Inc. (Baker). 1994. *Final Remedial Investigation Report, Operable Unit No. 1 (Sites21, 24, & 78), Marine Corps Base Camp Lejeune, North Carolina*. June.

CH2M HILL. 2010. *Final Focused Preliminary Assessment/Site Inspection Report, Hadnot Point Construction Area, Post Office Intersection Area, and Fitness Center, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina.* October.

Figures

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Legend

- Highways
- Surface Water Course Centerline
- Hadnot Point Construction Area
- Non-Industrial Use Control Boundary
- Operable Unit 1
- Installation Boundary

N

0 300 600 1,200 Feet

1 inch = 600 feet

Figure 1
Site Location Map
Human Health Evaluation/Ecological Risk Assessment Update
MCB CamLej
North Carolina

CH2MHILL.

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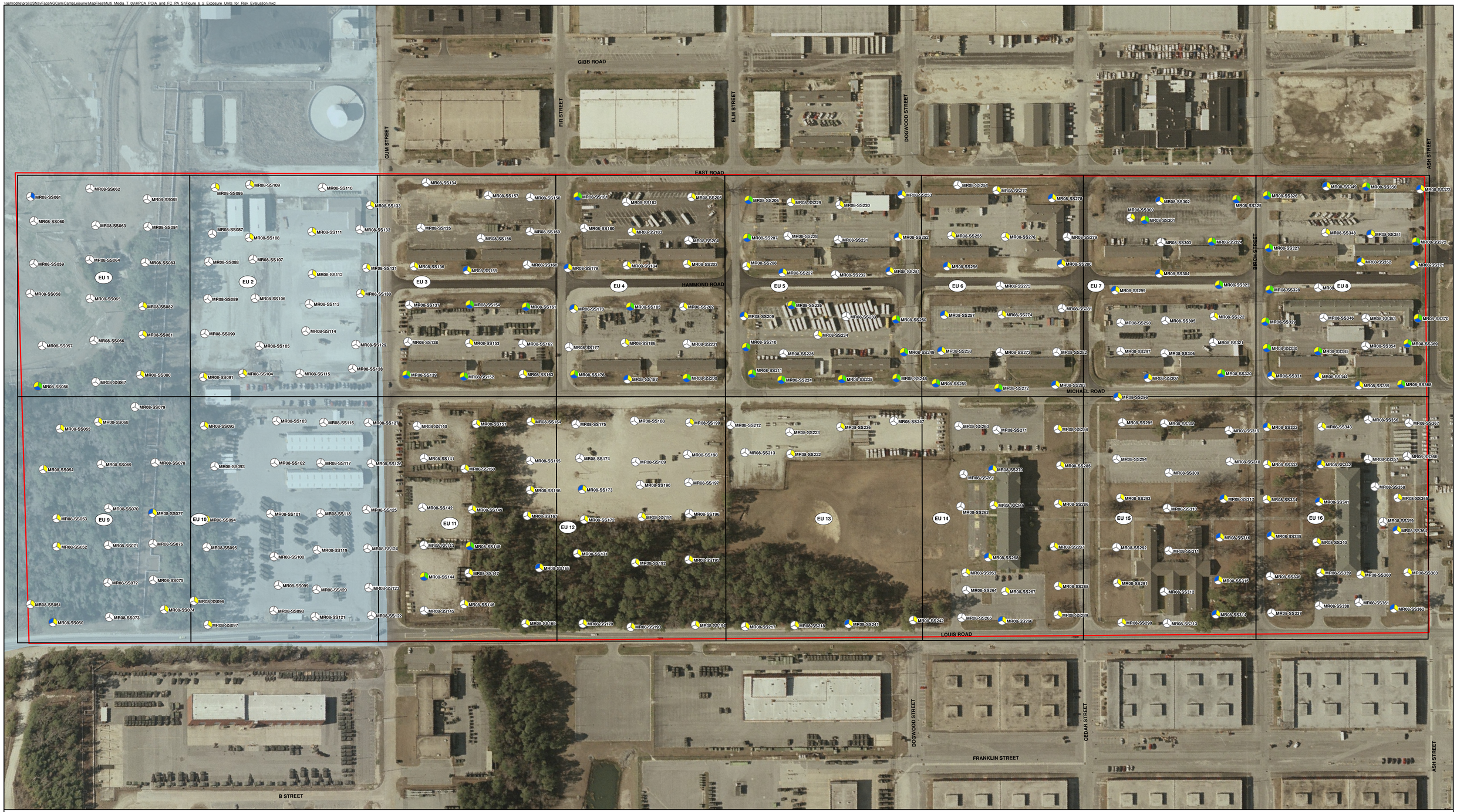

Legend

- Hadnot Point Construction Area
- Site UXO-08
- Exposure Units (EU)

Surface Soil SVOC Exceedances

- RSL Industrial Soil Adjusted
- RSL Residential Soil Adjusted
- NC SSL (January 2010)

0 120 240 Feet

1 inch = 120 feet

Figure 2
Soil Exposure Units for Human Health Evaluation
Hadnot Point Construction Area
Human Health Evaluation/Ecological Risk Assessment Update
MCB CamLej
North Carolina

CH2MHILL

Generated by: *Dan Brown/CLT* Checked by: *Anne Gallagher/NWO*

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Legend

- Surface Water and Sediment Sample Locations
- Surface Water Centerline
- Hadnot Point Construction Area

N

0 200 400 800 Feet

1 inch = 400 feet

Figure 3
202K Surface Water and Sediment Sample Locations
Human Health Evaluation/Ecological Risk Assessment Update
MCB CamLej
North Carolina

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Attachment A

Hadnot Point Construction Area Ecological Risk Assessment Marine Corps Base Camp Lejeune

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Introduction

The following ecological risk assessment (ERA) completes Steps 1 through 3a of the ERA process for the Hadnot Point Construction Area (HPCA), Marine Corps Base Camp Lejeune. The ERA was performed in accordance with the following guidance:

- Ecological Risk Assessment Guidance for Superfund (RAGS): Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1997a)
- Region 4 Ecological Risk Assessment Bulletins – Supplement to RAGS (USEPA, 2001)
- Navy Guidance for Conducting Ecological Risk Assessments (Navy, 2003)
- NCDENR Guidelines for Performing Screening Level Ecological Risk Assessments within the North Carolina Division of Waste Management (NCDENR, 2003).

The assessment was funded under Installation Restoration (IR) Site 78. Site 78 intersects the HPCA (**Figure 1**).

Step 1—Preliminary Problem Formulation and Ecological Effects Evaluation

Problem Formulation

The problem formulation covers the physical layout of the site, its history and ecology, available analytical data, fate and transport mechanisms, complete exposure pathways, and receptors of concern.

Site Description and Risk Analysis History

The HPCA encompasses approximately 109 acres and is bounded by Louis Road to the southeast, Ash Street to the northeast, East Road to the northwest, and athletic fields to the southwest (**Figure 1**). Much of the HPCA is paved (e.g., roadways, parking lots, loading dock areas, storage lots). There are two woodlots, covering several acres each, and areas with maintained landscapes. A large drainage feature is located in the western portion of the HPCA. The channel conveys water from portions of the HPCA (and areas to the west and north) to Louis Road.

An ecological risk screening (ERS) was previously prepared for the HPCA as part of a Focused Preliminary Assessment/Site Inspection (PA/SI) (CH2M HILL, 2010). The ERS evaluated the potential for ecological risks associated with exposure to surface soil, subsurface soil, surface water, sediment, and groundwater. The results of the screening indicated that there are no significant risks anticipated for ecological receptors exposed to subsurface soil and groundwater. Constituents, by medium, that were found to warrant further consideration are as follows:

- Surface soil—PAHs, antimony, cadmium, lead, mercury, silver, and zinc
- Surface water—barium, cadmium, chromium, copper, lead, selenium, zinc
- Sediment—antimony, arsenic, barium, cadmium, copper, lead, selenium, PAHs

Because the ERS indicated the potential for risk, initiation of the formal U.S. Environmental Protection Agency (USEPA) 8-step ERA process was required. This ERA further evaluates the surface soil, surface water, and sediment data that were collected at the HPCA as part of the PA/SI.

Ecological Setting

The New River, a coastal blackwater river, and its watershed sit within Onslow County. The Base and the City of Jacksonville are located within the watershed. Upgradient of Jacksonville, the watershed is characterized by gum-cypress swamps, with upland areas used primarily for forestry and agriculture. At Jacksonville, the river widens into a broad, slow-moving tidal embayment. About 16 miles south of Jacksonville, it discharges into the Atlantic Ocean through a narrow opening called New River Inlet. Jacksonville and the Base comprise the majority of land in the lower watershed (the area downstream of the U.S. 17 Bypass). There are 223 stream miles, 22,810 estuarine acres, and 15 miles of Atlantic coastline in this subbasin.

This portion of the North Carolina coast consists of sandy beaches. The adjacent upland area transitions to a region of pines (*Pinus* sp.), scrub oaks (*Quercus* sp.), sweet gum (*Liquidambar styraciflua*), and dogwood (*Cornus* sp.). Wire grass (*Cynodon dactylon*) is the primary undergrowth species. The area is interspersed with bottomland hardwood forests which are dominated by bald cypress (*Taxodium distichum*), swamp tupelo (*Nyssa sylvatica* var. *biflora*), and white cedar (*Chamaecyparis thyoides*). Croplands are common in this area, and consist of mostly corn, cotton, peanuts, and tobacco.

The climate in Jacksonville is characterized by short, mild winters and long, hot, humid summers. Average annual net precipitation is approximately 50 inches. Ambient air temperatures generally range from 33 to 53°F in the winter months, and 71°F to 88°F during the summer months.

As noted above, the majority of the HPCA is developed. The largest woodlot is approximately 10 acres, located in the southwestern corner of the site. The length of the drainage that traverses this area is about 900 feet. It is referred to as a drainage rather than a stream because it has been physically altered. An ecological checklist identifies the terrestrial and aquatic habitats on-site and nearby and was presented in the ERS as part of the PA/SI (CH2M HILL, 2010). As discussed in the ERS, threatened or endangered species located in Onslow County are not expected to occur at the site or in the adjacent areas.

A field survey of the drainage was conducted by CH2M HILL personnel in October 2011. Based on the survey, the drainage supports limited wildlife use and is poor aquatic habitat.

Summary of Available Analytical Data

Soil, surface water, and sediment data used for this assessment were collected from the HPCA in 2008 and 2009 (Table 1). The following samples were used for the assessment:

- 310 surface soil samples (plus 23 field duplicates) from 0 to 1 feet below ground surface (bgs).
- 3 surface water samples (plus 1 field duplicate)
- 3 sediment samples (plus 1 field duplicate)

Samples are listed in Table 1. While data from additional media (subsurface soil and groundwater) were available, only those media identified as potentially posing risk (surface soil, surface water, sediment) in the PA/SI were evaluated as part of this ERA.

Fate and Transport Mechanisms

Release and transport mechanisms at the site, as they relate to ecological exposures, are briefly discussed below.

Leaching to Groundwater Groundwater data were collected and evaluated as part of the ERS as part of the PA/SI. No risk from exposure to groundwater via discharge to surface water was predicted**. Consequently, this pathway was** not evaluated further in this ERA.

Surface Water Runoff and Erosion Much of the HPCA is paved (e.g., roadways, parking lots, loading dock areas, storage lots). There are two woodlots, covering several acres each, and areas with maintained landscapes. A large drainage feature is located in the western portion of the HPCA. The channel conveys stormwater from portions of the HPCA (and areas to the west and north) to Louis Road. In general, high rates of infiltration are expected across the unpaved portions of the site and erosion is expected to be minimal due to the relatively flat terrain and because a portion of the area is vegetated with grass or woods.

Dust Soil dust at the site is not expected to be significant because the majority of the site is covered by grass or pavement.

Conceptual Site Model

Information regarding the general habitat features of HPCA and the fate and transport of the chemicals associated with site media was used to build an ecological conceptual site model (CSM). Key components of the CSM include chemical sources, release and transport mechanisms, exposure media, receptors, and exposure routes (Figure 2).

Potentially complete and significant exposure pathways to terrestrial ecological receptors include the following:

- Direct exposure to plants (root uptake) and soil invertebrates (dermal and direct ingestion)
- Direct exposure to aquatic biota (root uptake for plants and dermal and direct ingestion for aquatic biota)
- Incidental ingestion and dermal exposure for wildlife
- Food chain (prey consumption) exposures for wildlife

The most significant exposure source is likely to be soil within the site. However, contamination may enter the aquatic drainage feature in the west portion of the site via overland flow.

Terrestrial and semi-aquatic bird and mammal species that are representative of HPCA include the white-footed mouse (mammalian omnivore), red fox (mammalian omnivore), raccoon (mammalian omnivore), American robin (avian omnivore), mourning dove (avian herbivore), marsh wren (avian insectivore), and belted kingfisher (avian carnivore).

Ecological Effects Evaluation

The potential for effects from exposure to soil, surface water, and sediment was evaluated by comparing ecological screening values (ESVs) to maximum concentrations (Step 2) of constituents detected at the site.

For soil, the EPA Ecological Soil Screening Levels (EcoSSL) (USEPA, 2009a) were preferentially selected over Region 4 values (USEPA, 2001). When no EcoSSL was available for a constituent, the Region 4 value was selected. A selection hierarchy was also applied to surface water. The National Recommended Water Quality Criteria (NRWQC) were preferentially selected over the Region 4 values (USEPA, 2009b). However, when no NRWQC was available for a constituent, the Region 4 value was selected as the ESV for that constituent. Freshwater screening values were selected for the surface water comparison. The assessment of sediment involved comparison of analyte concentrations to the Region 4 ESVs (USEPA, 2001).

Step 2—Preliminary Exposure Estimate and Risk Calculation

In Step 2, risk to ecological receptors was evaluated by calculating Hazard Quotients (HQs). HQs are calculated by dividing the maximum concentration detected within a medium by the corresponding medium-specific ESV. Maximum concentrations for detected analytes and maximum detection limits for undetected analytes were used to conservatively estimate potential chemical exposures to ecological receptors. Risk estimates were calculated for surface soil and subsurface soil (Tables 2 and Table 3).

North Carolina SLERA guidance (NCDENR, 2003) requires that constituents falling into one of the following categories be identified as a Step 2 Contaminant of Potential Concern (COPC):

- Category 1 – Contaminants with a maximum detection exceeding the ESV
- Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV
- Category 3 – Detected contaminants with no ESV
- Category 4 – Undetected contaminants with no ESV

Based on the results, 10 inorganics, 49 SVOCs, and 34 VOCs in surface soil; 16 explosives, 7 inorganics, 43 SVOCs, and 24 VOCs in surface water; and 17 explosives, 9 inorganics, 57 SVOCs, and 46 SVOCs in sediment were carried forward to Step 3.

Step 3a—Refinement of Conservative Exposure Assumptions

Using the same conceptual site model, Step 3a involves re-evaluation of the conservative assumptions used in Steps 1 and 2, resulting in a refinement of the COPC list. Step 3a includes a re-assessment of the risks to lower trophic levels receptors (direct exposure) and an evaluation, for the subset of contaminants that are bioaccumulative, of the potential for risks to upper trophic level receptors (food chain transfer).

Maximum concentrations of inorganics in surface soil were also compared to the background threshold value (BTV) for developed areas (CH2M HILL, 2011). The BTV represents a 95/95 upper tolerance limit (UTL), which is an upper bound (with 95 percent confidence) of the background 95th percentile. When maximum concentrations exceeded the associated background BTV, the analyte was retained for further evaluation.

Non-detected constituents were excluded from further consideration. If a constituent was not detected with current analytical methods, is highly unlikely that it would pose a significant risk to receptor populations.

Direct Exposure Screening

The risk to lower trophic level receptors was recalculated using arithmetic means. The more conservative 95% UCL on the mean was not used for soil because of the large number of available samples. For surface water and sediment, there were too few samples to calculate a 95% UCL.

As part of the Step 3a refinement, ESVs that were previously based on bird or mammal EcoSSLs in Step 2 were updated to reflect the lower of the plant or invertebrate EcoSSL. Because birds and mammals are further evaluated in Step 3a based on food chain modeling, the direct exposure screening in Step 3 is relevant only to lower trophic level receptors such as plants and invertebrates.

Risks were further evaluated using a weight-of-evidence (WOE) approach not utilized in Step 2. The WOE approach considers the magnitude of the recalculated risks, toxicity information not used in the Step 2 screening, frequency of detection, magnitude of exceedance, and the distribution of detected concentrations.

Tables 5 through 8 present the results of the direct exposure assessment for surface soil, surface water, and sediment. A summary of the screening results is presented below.

Surface Soil

Based on refined screening, five PAHs, two phthalates, hexachlorobenzene, chloroform, and trichloroethene all had HQs greater than one (Table 5). Of these, anthracene, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, hexachlorobenzene, chloroform, and trichloroethene all had low frequencies of detection (less than 5 percent) and are not considered to pose significant risk. Additionally, both phthalates are known to be common laboratory contaminants (DTSC, 2006).

PAHs were further evaluated by summing low molecular weight and high molecular weight PAHs and comparing to associated benchmarks (Table 6). Based on this additional analysis, the majority of risk from PAHs is related to a few samples. For low molecular weight PAHs, when the sample with the highest concentrations (MR08-SS325) is not considered, the HQ based on the summed concentration from the second highest sample (MR08-SS185) is less than one. For high molecular weight PAHs, the HQ using the summed concentrations from the second and third highest samples are still above one but the magnitude of exceedance is low and the concentrations drop an order of magnitude compared to the sample with the highest sum. Considering 280 surface soil samples were analyzed for PAHs and the majority of risk was the result of three elevated sample locations, overall risk from PAHs is considered low.

Surface Water

Based on the refined screening, barium, cadmium, copper, lead, selenium, zinc, bis(2-ethylhexyl)phthalate, phenanthrene, and acetone had mean-based HQs greater than one (Table 7). Lead and selenium both had low

magnitudes of exceedance (HQ were all less than 2) and are not expected to pose a significant risk. Cadmium, copper, and zinc all had HQs greater than 2 and have the potential to pose risk to aquatic organisms. It should be noted, however, that metals data were based on total concentrations as opposed to dissolved, which likely overestimates predicted risk.

Sediment

Based on the refined screening, antimony, arsenic, cadmium, copper, lead, selenium, and four PAHs were found to have HQs greater than one (Table 8). Of these, antimony, cadmium, lead, fluoranthene, naphthalene, and phenanthrene all had low magnitudes of exceedance (HQs were all less than 3). Arsenic, lead, and 2-methylnaphthalene all had HQs greater than 3. These analytes have the potential to pose risk to lower trophic level receptors in sediments.

Food Chain Transfer Screening

Food chain modeling was conducted for detected constituents carried to Step 3 and identified as bioaccumulative in USEPA (2000). Food chain modeling was initially conducted for the terrestrial and semi-aquatic bird and mammal receptors using maximum concentrations of analytes in surface soils and sediment. If analytes posed a risk based on maximum concentrations, modeling was refined using an arithmetic mean.

Receptors selected for the evaluation include the white-footed mouse, red fox, raccoon, American robin, mourning dove, marsh wren, and belted kingfisher. The basis for modeling for terrestrial receptors was surface soil and surface water. For semi-aquatic receptors, the basis for modeling was sediment and surface water. The raccoon was modeled using both sediment and surface soil concentrations.

Risks to upper trophic level receptors were evaluated by modeling exposure to analytes via the ingestion of constituents which have accumulated in prey. Incidental ingestion of soil or sediment was also included when calculating exposure. Dietary items for which tissue concentrations were modeled included terrestrial plants, terrestrial invertebrates, aquatic invertebrates, fish, and mammals.

For the maximum exposure case, two HQs were developed. Each exposure estimate was calculated and compared to two types of toxicity reference values (TRVs), no observed adverse effect levels (NOAELs) and lowest observed adverse effects levels (LOAELs). If the LOAEL-based HQ was over 1, the exposure estimate based on the arithmetic mean (i.e., also referred to as the EPC) was calculated. When HQs based on the NOAEL are below 1, there is high confidence of no significant risk. When HQs based on the LOAEL are above 1, risk may be present.

Exposure Assessment

Exposure Point Concentrations EPCs are the environmental media concentrations of COPCs that receptors are assumed to encounter in an exposure area. Risk calculations were initially developed using the maximum concentration. If the LOAEL-based HQ was greater than one, risk was reevaluated using an arithmetic mean

Exposure Parameters Receptor-specific inputs are presented in Table 9. Central tendency estimates (e.g., mean, median, or midpoint) for body weight and ingestion rates from the scientific literature were used for each receptor. It was assumed that chemicals were 100 percent bioavailable to the receptor and that each receptor spent 100 percent of its time on the site (i.e., an area use factor [AUF] of 1.0 was assumed).

Concentrations in Food Items The concentrations of COPCs in food items were estimated rather than measured. For the purposes of exposure estimation, partitioning of constituents from environmental media to prey was estimated from literature values. The conservative model assumptions included bioaccumulation factors (BAFs) from the literature. The BAFs and other uptake or biotransfer factors used to estimate constituent concentrations in food items are provided in Table 10. In all cases, it was assumed that tissue uptake occurs under steady-state conditions.

Calculation of Chemical Intakes Dietary exposure includes multiple pathways and requires modeling. The end product or exposure estimate resulting from exposure modeling for wildlife is a dosage (amount of chemical per kilogram receptor body weight per day [mg/kg/d]). Dietary exposure from food and incidental ingestion of soil or sediment was estimated using a generalized exposure model modified from Suter et al. (2000):

$$E_j = \left[\left(Med_{jk} * Pk * FIR \right) + \left(\sum_{i-1}^{N} B_{ij} * P_i * FIR \right) \right] * AUF$$

where:

E_j	= total dietary exposure (mg/kg/d)
Med_{jk}	= concentration of chemical (j) in medium (k) (mg/kg dry weight)
P_k	= ingestion rate of medium (k) as proportion of diet
FIR	= species-specific food ingestion rate (kg food/kg body weight/d)
B_{ij}	= concentration of chemical (j) in biota type (i) (mg/kg dry weight)
P_i	= proportion of biota type (i) in diet
AUF	= area use factor (unitless)

Effects Assessment

Compilation of Toxicity Data Currently available toxicological data were evaluated and a range of potential effects was determined using procedures recommended by USEPA (1997a). Data were extracted from original literature sources (when available) to verify levels of effects, quality of study design, magnitude of dose, and other study parameters. Sources for toxicity data included the following:

- Toxicological Benchmarks for Wildlife, produced for the Department of Energy at Oak Ridge National Laboratories (ORNL) (Sample et al., 1996)
- Ecological Soil Screening Values (Eco SSLs) (USEPA, 2009a)
- The National Institutes of Health (NIH) Agency for Toxic Substances and Disease Registry (ATSDR) Toxicity Profiles and reports
- Peer-reviewed scientific literature

Ingestion toxicity reference values (TRVs) were selected for both chronic NOAEL and chronic LOAEL endpoints (Tables 11 and 12). Because the risk assessment is based upon population- or community-level effects, no intraspecies uncertainty factors were applied. Taxonomic class-type uncertainty factors were also not applied because the TRVs selected were typically derived based upon data from a broad range of taxonomic groups.

Food chain COPCs were identified based upon a comparison of exposure doses from site-specific food chain modeling with the NOAEL- and LOAEL-based ingestion TRVs.

Risk Results

The results of the food chain modeling for terrestrial wildlife exposed to maximum concentrations in surface soil or sediment are presented in Table 13. Zinc and PAHs, with the exception of pyrene, had NOAEL- and LOAEL-based HQs of less than one for all receptors. Pyrene, cadmium, mercury, and silver had NOAEL-based HQs greater than 1 but LOAEL-based HQ less than one for all receptors suggesting that risk to populations is low. Arsenic, copper, lead and selenium all had NOAEL- and LOAEL-based HQs greater than one for the marsh wren and/or mourning dove.

Arsenic, copper, lead, and selenium were retained for further evaluation using the arithmetic mean. Selenium was the only analyte to have a LOAEL-based HQ greater than one for either receptor (Table 14). Selenium had an HQ of 2.2 for the marsh wren.

Uncertainty

Uncertainties are inherent in all risk assessments. In general, risks are over-estimated in this evaluation through the use of conservative exposure, effects, and risk characterization assumptions described in the previous sections. A qualitative evaluation of the major general uncertainties associated with this assessment is presented below.

Effects Assessment Uncertainties

Literature-derived toxicity data based on laboratory studies were the only available toxicity data used to evaluate risk to all receptor groups. It was assumed that effects observed in laboratory species were indicative of effects that would occur in wild species. The suitability of this assumption is unknown.

The use of uncertainty factors in the development of TRVs is designed to ensure that the TRV is a conservative estimate of a toxicological effect level or endpoint. However, there is some additional uncertainty associated with extrapolating TRVs between toxicological endpoints, species, duration, and study conditions to site conditions.

The TRVs developed from literature studies are usually based on a highly soluble and bioavailable form of the chemical. It is generally accepted that forms present in environmental media are not likely to be in a highly soluble form and, due to physical and chemical processes in the environment, are likely to be far less than 100 percent bioavailable. This difference between literature studies and site conditions may contribute to an over-estimation of potential exposure and risks from the COPCs.

Standard industry laboratory methods of analysis were used for the development of detection limits. In some instances, the methods produced detection limits that were higher than the ESVs. This is considered an acceptable uncertainty. Because these chemicals were not detected, they are not known to be present onsite, but the potential for risks cannot be totally discounted because the reporting limits for at least some samples are higher than the screening values.

Exposure Assessment Uncertainties

Exposure Media and Pathways Wildlife doses were estimated based on the ingestion pathway only. This is due to limitations in the field of ecological risk assessment with regard to adequately evaluating the volatilization (inhalation) and dermal absorption pathways. Although these pathways would not be expected to contribute significantly to the overall dose that receptors might receive from COPCs at this site, this is nonetheless an uncertainty inherent in the assessment.

Bioavailability The exposure dose estimates in this assessment assume that 100 percent of the chemical concentrations to which receptors are exposed are in the bioavailable form. However, most chemicals will not be 100 percent bioavailable. In cases where bioavailability is less than 100 percent, risk is over-estimated.

The exposure concentrations used in the evaluation of trophic transfer were assumed to remain constant for the duration of exposure. Physical, chemical, and biological processes that could reduce chemical concentrations and their bioavailability over time were not factored into the calculation of the exposure concentrations. Use of this additional conservative assumption is also likely to over-estimate exposure to the COPCs.

Analytical chemistry data collected within the exposure area at Site 78 were assumed to adequately represent the exposure to wildlife and exposure concentrations were assumed to represent the distribution of constituents present. These assumptions could either under- or over-estimate risk.

Receptor Life History Data No avian or mammalian life history data specific to the site were available; therefore, exposure parameters were either modeled based on allometric relationships (e.g., food ingestion rates) or were based on data from these same species in other portions of their range. Because diet composition as well as food, water, and soil ingestion rates can differ among individuals and locations, published parameter values may not accurately reflect conditions at the site. Consequently, risk may be either over- or under-estimated.

Dietary Composition Dietary compositions were simplified for the site receptors to estimate concentrations in food items using bioaccumulation models. It was assumed that concentrations were similar in comparable food types. The suitability of this assumption is unknown. Consequently, risk may be either over- or under-estimated.

Estimating Prey Tissue Concentration There is uncertainty associated with the estimated chemical concentrations in tissue of prey. Prey tissue concentrations were estimated using literature-based values for all dietary items. Potential risks based on these tissue concentration estimates, therefore, could either be over- or under-estimated.

Drainage Survey

A field survey of the drainage was conducted in October 2011 by CH2M HILL personnel. The drainage was evaluated at 11 survey points, at Louis Road, 50 feet upgradient of Louis Road, 100 feet upgradient of Louis Road, and at 100-foot intervals upgradient thereafter until the last survey point located 900 feet upgradient. Table 15 presents the findings at each survey location. A brief summary of the survey results is listed below.

- Four discharges (assumed to be stormwater)
- Debris/trash at 10 of 11 locations
- Upgradient one-third of the drainage appears to be man made
- Evidence of drainage bed excavation at 6 of 11 points (including native section)
- Excavation has created deep channel (e.g., top of bank to bottom of bed is deep, with a relatively small bed width)
- Majority of length has steep, vertical, or undercut banks
- Water was stagnant; average depth less than 6 inches (dry over much of length during Summer 2011 based on visit by CH2M HILL natural resource professionals)
- Limited wildlife observations - raccoon tracks, one frog, no bird nests observed
- No fish or aquatic invertebrates observed
- Sediment - silty sand to silty clay
- Sediment depth ranged from 1 to 34 inches (deepest in downgradient portion)
- Water color and sediment typical of areas subject to runoff

Based on the drainage survey, the drainage supports limited wildlife use and is poor aquatic habitat. The key function of the drainage is stormwater management. During a storm, water likely backs up at Louis Road. The drainage channel serves as a detention basin. Suspended material falls out or is filtered by vegetation as evidenced by the deep sediment near Louis Road. The water flows into a culvert at Louis Road. Several hundred feet downgradient, it daylights into a wood area. Eventually, the water reaches the New River. Viewed in a broader landscape context, the on-site portion of the drainage serves to protect the downgradient water quality of less disturbed areas that have much higher ecological value.

Risk Characterization

Risk to lower trophic level receptors exposed to surface soils is considered low and driven by only a few elevated samples. Using the EPC, there were no HQs above 1 for wildlife. Overall, soil is not expected to pose a significant risk to receptor populations.

Potential risk was predicted for lower trophic level receptors exposed to some analytes in surface water and sediment in the drainage. However, it is poor aquatic habitat, independent of the exceedances of some benchmarks for surface water and sediment. The drainage has been altered through excavation and the flow is intermittent. The water is likely shallow and stagnant over a significant portion of the year. When it does rain, the drainage is subject to high flows. As discussed prior, the major function of the drainage is stormwater management. Because of the limited quality, the use is limited, and therefore risk to ecological receptor populations is considered low.

Selenium, which has no defined source at the site, was the only analyte to have an HQ greater than one based on the refined food chain modeling, with the majority of predicted risk posed by selenium concentrations in sediment. While this risk to insectivorous birds was identified, the results of the drainage survey suggest population level impacts are unlikely. The spatial area covered by the drainage is relatively small and the aquatic habitat is poor (e.g., no benthic invertebrates were observed). Because the prey base associated with the

sediment is limited, risk to insectivorous birds is also limited. In addition, the selenium concentration in the next available sediment sample downgradient of where drainage daylights was only 0.33 mg/kg (78-CC-SW/SD-10; Navy, 1994), which is less than the Base background threshold value of 0.896 mg/kg for soil in developed areas. The difference between the on-site drainage and downgradient stretch is further confirmation that the drainage serves to retain contaminants in stormwater runoff.

Conclusions

Overall, risks from surface soil, sediment, and surface water at the HPCA are considered low. While some elevated concentrations exist within the drainage channel, the physical characteristics limit the potential for ecological exposure. In addition, the stormwater management functions provided by the drainage are likely protecting downgradient water quality in areas with higher ecological value. The conclusion of the assessment is that significant impacts to receptor populations are unlikely. No further action is recommended.

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TABLE 1

Surface Soil, Surface Water, and Sediment Sample Locations used in the ERA

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Sample Location	Sample Type	Date
Surface Soil		
MR08-SS134-08D	Normal Sample	12/17/08
MR08-SS135-08D	Normal Sample	12/17/08
MR08-SS136-08D	Normal Sample	12/18/08
MR08-SS137-08D	Normal Sample	12/18/08
MR08-SS138-08D	Normal Sample	12/19/08
MR08-SS139-08D	Normal Sample	12/18/08
MR08-SS139D-08D	Duplicate Sample	12/18/08
MR08-SS140-09A	Normal Sample	01/06/09
MR08-SS141-09A	Normal Sample	01/06/09
MR08-SS142-09A	Normal Sample	01/05/09
MR08-SS143-09A	Normal Sample	01/05/09
MR08-SS144-09A	Normal Sample	01/05/09
MR08-SS145-09A	Normal Sample	01/05/09
MR08-SS146-09A	Normal Sample	01/05/09
MR08-SS147-09A	Normal Sample	01/05/09
MR08-SS148-09A	Normal Sample	01/05/09
MR08-SS149-09A	Normal Sample	01/05/09
MR08-SS149D-09A	Duplicate Sample	01/05/09
MR08-SS150-09A	Normal Sample	01/06/09
MR08-SS151-09A	Normal Sample	01/06/09
MR08-SS152-08D	Normal Sample	12/18/08
MR08-SS153-09A	Normal Sample	01/21/09
MR08-SS154-08D	Normal Sample	12/18/08
MR08-SS154D-08D	Duplicate Sample	12/18/08
MR08-SS155-08D	Normal Sample	12/18/08
MR08-SS156-08D	Normal Sample	12/17/08
MR08-SS157-08D	Normal Sample	12/17/08
MR08-SS158-08D	Normal Sample	12/17/08
MR08-SS159-08D	Normal Sample	12/17/08
MR08-SS160-08D	Normal Sample	12/18/08
MR08-SS161-08D	Normal Sample	12/18/08
MR08-SS162-09A	Normal Sample	01/21/09
MR08-SS163-08D	Normal Sample	12/18/08
MR08-SS164-08D	Normal Sample	12/20/08
MR08-SS165-08D	Normal Sample	12/20/08
MR08-SS166-08D	Normal Sample	12/20/08
MR08-SS167-08D	Normal Sample	12/20/08
MR08-SS168-09A	Normal Sample	01/06/09
MR08-SS169-09A	Normal Sample	01/11/09
MR08-SS169-09A-2	Normal Sample	01/14/09
MR08-SS169D-09A	Duplicate Sample	01/11/09
MR08-SS170-09A	Normal Sample	01/11/09
MR08-SS171-09A	Normal Sample	01/06/09
MR08-SS172-08D	Normal Sample	12/20/08
MR08-SS173-08D	Normal Sample	12/20/08
MR08-SS174-08D	Normal Sample	12/20/08
MR08-SS175-08D	Normal Sample	12/19/08
MR08-SS176-08D	Normal Sample	12/19/08
MR08-SS177-08D	Normal Sample	12/18/08

TABLE 1

Surface Soil, Surface Water, and Sediment Sample Locations used in the ERA

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Sample Location	Sample Type	Date
MR08-SS178-08D	Normal Sample	12/18/08
MR08-SS178D-08D	Duplicate Sample	12/18/08
MR08-SS179-08D	Normal Sample	12/18/08
MR08-SS180-09A	Normal Sample	01/09/09
MR08-SS181-08D	Normal Sample	12/17/08
MR08-SS182-09A	Normal Sample	01/09/09
MR08-SS183-09A	Normal Sample	01/09/09
MR08-SS184-09A	Normal Sample	01/09/09
MR08-SS185-08D	Normal Sample	12/22/08
MR08-SS186-08D	Normal Sample	12/22/08
MR08-SS187-08D	Normal Sample	12/19/08
MR08-SS188-08D	Normal Sample	12/19/08
MR08-SS189-08D	Normal Sample	12/20/08
MR08-SS189D-08D	Duplicate Sample	12/20/08
MR08-SS190-08D	Normal Sample	12/20/08
MR08-SS191-08D	Normal Sample	12/20/08
MR08-SS192-09A	Normal Sample	01/06/09
MR08-SS193-09A	Normal Sample	01/11/09
MR08-SS194-09A	Normal Sample	01/11/09
MR08-SS195-09A	Normal Sample	01/06/09
MR08-SS196-08D	Normal Sample	12/21/08
MR08-SS197-08D	Normal Sample	12/21/08
MR08-SS198-08D	Normal Sample	12/21/08
MR08-SS199-08D	Normal Sample	12/21/08
MR08-SS199D-08D	Duplicate Sample	12/21/08
MR08-SS200-08D	Normal Sample	12/21/08
MR08-SS201-08D	Normal Sample	12/22/08
MR08-SS202-08D	Normal Sample	12/22/08
MR08-SS203-09A	Normal Sample	01/09/09
MR08-SS204-09A	Normal Sample	01/09/09
MR08-SS205-09A	Normal Sample	01/09/09
MR08-SS206-09A	Normal Sample	01/08/09
MR08-SS207-09A	Normal Sample	01/08/09
MR08-SS208-09A	Normal Sample	01/08/09
MR08-SS209-09A	Normal Sample	01/08/09
MR08-SS209D-09A	Duplicate Sample	01/08/09
MR08-SS210-09A	Normal Sample	01/06/09
MR08-SS211-08D	Normal Sample	12/21/08
MR08-SS212-09A	Normal Sample	01/20/09
MR08-SS213-09A	Normal Sample	01/20/09
MR08-SS217-09A	Normal Sample	01/11/09
MR08-SS218-09A	Normal Sample	01/11/09
MR08-SS222-09A	Normal Sample	01/20/09
MR08-SS223-09A	Normal Sample	01/20/09
MR08-SS224-08D	Normal Sample	12/21/08
MR08-SS225-09A	Normal Sample	01/07/09
MR08-SS226-09A	Normal Sample	01/07/09
MR08-SS227-09A	Normal Sample	01/08/09
MR08-SS228-09A	Normal Sample	01/08/09
MR08-SS229-09A	Normal Sample	01/08/09

TABLE 1

Surface Soil, Surface Water, and Sediment Sample Locations used in the ERA

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Sample Location	Sample Type	Date
MR08-SS229D-09A	Duplicate Sample	01/08/09
MR08-SS230-09A	Normal Sample	01/10/09
MR08-SS231-09A	Normal Sample	01/10/09
MR08-SS232-09A	Normal Sample	01/10/09
MR08-SS233-09A	Normal Sample	01/07/09
MR08-SS234-09A	Normal Sample	01/07/09
MR08-SS235-08D	Normal Sample	12/21/08
MR08-SS236-09A	Normal Sample	01/20/09
MR08-SS241-09A	Normal Sample	01/11/09
MR08-SS242-09A	Normal Sample	01/11/09
MR08-SS247-09A	Normal Sample	01/21/09
MR08-SS248-09A	Normal Sample	01/07/09
MR08-SS249-09A	Normal Sample	01/07/09
MR08-SS249D-09A	Duplicate Sample	01/07/09
MR08-SS250-09A	Normal Sample	01/07/09
MR08-SS251-09A	Normal Sample	01/10/09
MR08-SS252-09A	Normal Sample	01/10/09
MR08-SS253-09A	Normal Sample	01/10/09
MR08-SS254-09A	Normal Sample	01/09/09
MR08-SS255-09A	Normal Sample	01/09/09
MR08-SS256-09A	Normal Sample	01/10/09
MR08-SS257-09A	Normal Sample	01/07/09
MR08-SS258-09A	Normal Sample	01/07/09
MR08-SS259-09A	Normal Sample	01/10/09
MR08-SS259D-09A	Duplicate Sample	01/10/09
MR08-SS260-09A	Normal Sample	01/14/09
MR08-SS261-09A	Normal Sample	01/14/09
MR08-SS262-09A	Normal Sample	01/14/09
MR08-SS263-09A	Normal Sample	01/14/09
MR08-SS264-09A	Normal Sample	01/14/09
MR08-SS265-09A	Normal Sample	01/11/09
MR08-SS266-09A	Normal Sample	01/11/09
MR08-SS267-09A	Normal Sample	01/19/09
MR08-SS268-09A	Normal Sample	01/19/09
MR08-SS269-09A	Normal Sample	01/19/09
MR08-SS269D-09A	Normal Sample	01/19/09
MR08-SS270-09A	Normal Sample	01/19/09
MR08-SS271-09A	Normal Sample	01/19/09
MR08-SS272-09A	Normal Sample	01/10/09
MR08-SS273-09A	Normal Sample	01/07/09
MR08-SS274-09A	Normal Sample	01/07/09
MR08-SS275-09A	Normal Sample	01/10/09
MR08-SS276-09A	Normal Sample	01/09/09
MR08-SS277-09A	Normal Sample	01/09/09
MR08-SS278-09A	Normal Sample	01/09/09
MR08-SS279-09A	Normal Sample	01/25/09
MR08-SS279D-09A	Duplicate Sample	01/25/09
MR08-SS280-09A	Normal Sample	01/10/09
MR08-SS281-09A	Normal Sample	01/08/09
MR08-SS282-09A	Normal Sample	01/08/09

TABLE 1

Surface Soil, Surface Water, and Sediment Sample Locations used in the ERA

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Sample Location	Sample Type	Date
MR08-SS283-09A	Normal Sample	01/10/09
MR08-SS284-09A	Normal Sample	01/13/09
MR08-SS285-09A	Normal Sample	01/13/09
MR08-SS286-09A	Normal Sample	01/14/09
MR08-SS287-09A	Normal Sample	01/14/09
MR08-SS288-09A	Normal Sample	01/14/09
MR08-SS289-09A	Normal Sample	01/11/09
MR08-SS289D-09A	Duplicate Sample	01/11/09
MR08-SS290-09A	Normal Sample	01/11/09
MR08-SS291-09A	Normal Sample	01/12/09
MR08-SS292-09A	Normal Sample	01/12/09
MR08-SS293-09A	Normal Sample	01/12/09
MR08-SS294-09A	Normal Sample	01/12/09
MR08-SS295-09A	Normal Sample	01/12/09
MR08-SS296-09A	Normal Sample	01/12/09
MR08-SS297-09A	Normal Sample	01/08/09
MR08-SS298-09A	Normal Sample	01/08/09
MR08-SS299-09A	Normal Sample	01/13/09
MR08-SS299D-09A	Duplicate Sample	01/13/09
MR08-SS300-09A	Normal Sample	01/12/09
MR08-SS301-09A	Normal Sample	01/12/09
MR08-SS302-09A	Normal Sample	01/12/09
MR08-SS303-09A	Normal Sample	01/12/09
MR08-SS304-09A	Normal Sample	01/13/09
MR08-SS305-09A	Normal Sample	01/08/09
MR08-SS306-09A	Normal Sample	01/08/09
MR08-SS307-09A	Normal Sample	01/13/09
MR08-SS308-09A	Normal Sample	01/13/09
MR08-SS309-09A	Normal Sample	01/13/09
MR08-SS309D-09A	Duplicate Sample	01/13/09
MR08-SS310-09A	Normal Sample	01/13/09
MR08-SS311-09A	Normal Sample	01/13/09
MR08-SS312-09A	Normal Sample	01/13/09
MR08-SS313-09A	Normal Sample	01/11/09
MR08-SS314-09A	Normal Sample	01/22/09
MR08-SS315-09A	Normal Sample	01/21/09
MR08-SS316-09A	Normal Sample	01/21/09
MR08-SS317-09A	Normal Sample	01/21/09
MR08-SS318-09A	Normal Sample	01/21/09
MR08-SS319-09A	Normal Sample	01/21/09
MR08-SS319D-09A	Duplicate Sample	01/21/09
MR08-SS320-09A	Normal Sample	01/26/09
MR08-SS321-09A	Normal Sample	01/26/09
MR08-SS322-09A	Normal Sample	01/26/09
MR08-SS323-09A	Normal Sample	01/25/09
MR08-SS324-09A	Normal Sample	01/25/09
MR08-SS325-09A	Normal Sample	01/25/09
MR08-SS326-09A	Normal Sample	01/25/09
MR08-SS327-09A	Normal Sample	01/25/09
MR08-SS328-09A	Normal Sample	01/24/09

TABLE 1

Surface Soil, Surface Water, and Sediment Sample Locations used in the ERA

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Sample Location	Sample Type	Date
MR08-SS329-09A	Normal Sample	01/24/09
MR08-SS330-09A	Normal Sample	01/24/09
MR08-SS331-09A	Normal Sample	01/24/09
MR08-SS332-09A	Normal Sample	01/22/09
MR08-SS333-09A	Normal Sample	01/22/09
MR08-SS334-09A	Normal Sample	01/22/09
MR08-SS335-09A	Normal Sample	01/22/09
MR08-SS336-09A	Normal Sample	01/22/09
MR08-SS337-09A	Normal Sample	01/22/09
MR08-SS338-09A	Normal Sample	01/22/09
MR08-SS338D-09A	Duplicate Sample	01/22/09
MR08-SS339-09A	Normal Sample	01/22/09
MR08-SS340-09A	Normal Sample	01/22/09
MR08-SS341-09A	Normal Sample	01/22/09
MR08-SS342-09A	Normal Sample	01/22/09
MR08-SS343-09A	Normal Sample	01/22/09
MR08-SS344-09A	Normal Sample	01/24/09
MR08-SS345-09A	Normal Sample	01/24/09
MR08-SS345D-09A	Duplicate Sample	01/24/09
MR08-SS346-09A	Normal Sample	01/24/09
MR08-SS347-09A	Normal Sample	01/24/09
MR08-SS348-09A	Normal Sample	01/26/09
MR08-SS349-09A	Normal Sample	01/25/09
MR08-SS349D-09A	Duplicate Sample	01/25/09
MR08-SS350-09A	Normal Sample	01/25/09
MR08-SS351-09A	Normal Sample	01/26/09
MR08-SS352-09A	Normal Sample	01/25/09
MR08-SS353-09A	Normal Sample	01/24/09
MR08-SS354-09A	Normal Sample	01/24/09
MR08-SS355-09A	Normal Sample	01/23/09
MR08-SS356-09A	Normal Sample	01/23/09
MR08-SS357-09A	Normal Sample	01/23/09
MR08-SS358-09A	Normal Sample	01/23/09
MR08-SS359-09A	Normal Sample	01/23/09
MR08-SS360-09A	Normal Sample	01/23/09
MR08-SS360D-09A	Duplicate Sample	01/23/09
MR08-SS361-09A	Normal Sample	01/23/09
MR08-SS362-09A	Normal Sample	01/23/09
MR08-SS363-09A	Normal Sample	01/23/09
MR08-SS364-09A	Normal Sample	01/23/09
MR08-SS365-09A	Normal Sample	01/23/09
MR08-SS366-09A	Normal Sample	01/23/09
MR08-SS367-09A	Normal Sample	01/23/09
MR08-SS368-09A	Normal Sample	01/23/09
MR08-SS369-09A	Normal Sample	01/24/09
MR08-SS369D-09A	Duplicate Sample	01/24/09
MR08-SS370-09A	Normal Sample	01/24/09
MR08-SS371-09A	Normal Sample	01/25/09
MR08-SS372-09A	Normal Sample	01/25/09
MR08-SS373-09A	Normal Sample	01/25/09
MR08-SS373D-09A	Duplicate Sample	01/25/09

TABLE 1

Surface Soil, Surface Water, and Sediment Sample Locations used in the ERA

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Sample Location	Sample Type	Date
Surface Water		
MR08-SW01-08D	Normal Sample	11/11/08
MR08-SW02-08D	Normal Sample	11/11/08
MR08-SW02D-08D	Duplicate Sample	11/11/08
MR08-SW03-08D	Normal Sample	11/11/08
Sediment		
MR08-SD01-08D	Normal Sample	11/11/08
MR08-SD02-08D	Normal Sample	11/11/08
MR08-SD02D-08D	Duplicate Sample	11/11/08
MR08-SD03-08D	Normal Sample	11/11/08

TABLE 2
Surface Soil Screening - Step 2
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
ANTIMONY	1.57	to	2.41	60/84	10.7	MR08-SS096	0.27	39.6	Yes	(1) HQ above one, detected
ARSENIC	0.308	to	16.1	306/310	16.7 J	MR08-SS068	18	0.9	No	HQ less than one, detected
BARIUM	--	to	--	310/310	910	MR08-SS056	330	2.8	Yes	(1) HQ above one, detected
CADMIUM	0.0757	to	0.22	273/310	11.3	MR08-SS056	0.36	31.4	Yes	(1) HQ above one, detected
CHROMIUM	0.76	to	0.836	303/310	147 J	MR08-SS056	26	5.7	Yes	(1) HQ above one, detected
COPPER	1.58	to	1.72	79/84	184	MR08-SS056	28	6.6	Yes	(1) HQ above one, detected
LEAD	--	to	--	310/310	435	MR08-SS134	11	39.5	Yes	(1) HQ above one, detected
MERCURY	0.0962	to	0.224	121/310	9.22	MR08-SS056	0.1	92.2	Yes	(1) HQ above one, detected
SELENIUM	0.396	to	21.4	262/310	5.25 J	MR08-SS068	0.52	10.1	Yes	(1) HQ above one, detected
SILVER	0.361	to	1.78	159/310	108	MR08-SS056	4.2	25.7	Yes	(1) HQ above one, detected
ZINC	1.52	to	1.67	77/84	886 J	MR08-SS056	46	19.3	Yes	(1) HQ above one, detected
2,4,5-TRICHLOROPHENOL	0.51	to	5.3	0/280	--	--	4	1.3	Yes	(2) Not detected, HQ above one
2,4,6-TRICHLOROPHENOL	0.51	to	5.3	0/280	--	--	10	0.5	No	HQ less than one, not detected
2,4-DICHLOROPHENOL	0.51	to	5.3	0/280	--	--	0.003	1766.7	Yes	(2) Not detected, HQ above one
2,4-DIMETHYLPHENOL	0.51	to	5.3	0/279	--	--	--	NSV	Yes	(4) Not detected, no screening value
2,4-DINITROPHENOL	1.2	to	13	0/280	--	--	20	0.7	No	HQ less than one, not detected
2,4-DINITROTOLUENE	0.34	to	3.5	0/281	--	--	--	NSV	Yes	(4) Not detected, no screening value
2,6-DINITROTOLUENE	0.34	to	3.5	0/281	--	--	--	NSV	Yes	(4) Not detected, no screening value
2-CHLORONAPHTHALENE	0.34	to	3.5	0/280	--	--	1	3.5	Yes	(2) Not detected, HQ above one
2-CHLOROPHENOL	0.51	to	5.3	0/280	--	--	0.01	530.0	Yes	(2) Not detected, HQ above one
2-METHYLNAPHTHALENE	0.01	to	0.1	107/280	0.067	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
2-METHYLPHENOL	0.61	to	6.3	0/281	--	--	0.5	12.6	Yes	(2) Not detected, HQ above one
2-NITROANILINE	0.51	to	5.3	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
2-NITROPHENOL	0.61	to	6.3	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
3,3'-DICHLOROBENZIDINE	0.51	to	5.3	0/278	--	--	--	NSV	Yes	(4) Not detected, no screening value
3-NITROANILINE	0.51	to	5.3	0/279	--	--	--	NSV	Yes	(4) Not detected, no screening value
4,6-DINITRO-2-METHYLPHENOL	1.2	to	13	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
4-BROMOPHENYL-PHENYLETHER	0.34	to	3.5	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
4-CHLORO-3-METHYLPHENOL	0.51	to	5.3	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
4-CHLOROANILINE	0.51	to	5.3	0/275	--	--	20	0.3	No	HQ less than one, not detected
4-CHLOROPHENYL-PHENYLETHER	0.34	to	3.5	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROANILINE	0.51	to	5.3	0/279	--	--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROPHENOL	1.2	to	13	0/280	--	--	7	1.9	Yes	(2) Not detected, HQ above one

TABLE 2
Surface Soil Screening - Step 2
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
ACENAPHTHENE	0.34	to	3.5	16/280	1.4	MR08-SS325	20	0.1	No	HQ less than one, detected
ACENAPHTHYLENE	0.34	to	3.5	1/280	0.075 J	MR08-SS226	--	NSV	Yes	(3) Detected, no screening value
ACETOPHENONE	0.61	to	6.3	1/280	0.43 J	MR08-SS056	--	NSV	Yes	(3) Detected, no screening value
ANTHRACENE	0.34	to	3.5	7/280	3.3	MR08-SS325	0.1	33.0	Yes	(1) HQ above one, detected
ATRAZINE	0.34	to	3.5	0/280	--	--	0.00005	70000.0	Yes	(2) Not detected, HQ above one
BENZO(A)ANTHRACENE	0.01	to	0.1	237/280	25	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
BENZO(A)PYRENE	0.01	to	0.1	211/280	26	MR08-SS325	0.1	260.0	Yes	(1) HQ above one, detected
BENZO(B)FLUORANTHENE	0.01	to	0.1	198/280	32	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
BENZO(G,H,I)PERYLENE	0.01	to	0.1	235/280	19	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
BENZO(K)FLUORANTHENE	0.01	to	0.1	195/280	26	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
BIS(2-CHLOROETHOXY)METHANE	0.34	to	3.5	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
BIS(2-CHLOROETHYL)ETHER	0.34	to	3.5	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
BIS(2-ETHYLHEXYL)PHTHALATE	0.34	to	3.5	142/280	3.9	MR08-SS056	0.1	39.0	Yes	(1) HQ above one, detected
BUTYLBENZYLPHTHALATE	0.34	to	3.5	5/280	0.2 J	MR08-SS056	0.1	2.0	Yes	(1) HQ above one, detected
CAPROLACTAM	0.51	to	5.3	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
CARBAZOLE	0.51	to	5.3	5/280	5	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
CHRYSENE	0.34	to	3.5	58/280	38	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
DIBENZ(A,H)ANTHRACENE	0.01	to	0.1	132/280	9.4	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
DIBENZOFURAN	0.34	to	3.5	2/280	0.53	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
DIETHYLPHTHALATE	0.34	to	3.5	14/280	0.1 J	MR08-SS131	100	0.001	No	HQ less than one, detected
DIMETHYL PHTHALATE	0.34	to	3.5	0/280	--	--	200	0.02	No	HQ less than one, not detected
DI-N-BUTYLPHTHALATE	0.34	to	3.5	0/280	--	--	200	0.02	No	HQ less than one, not detected
DI-N-OCTYLPHTHALATE	0.34	to	3.5	0/280	--	--	0.1	35.0	Yes	(2) Not detected, HQ above one
FLUORANTHENE	0.01	to	0.1	253/281	80	MR08-SS325	0.1	800.0	Yes	(1) HQ above one, detected
FLUORENE	0.01	to	0.1	49/281	0.98 J	MR08-SS325	30	0.03	No	HQ less than one, detected
HEXACHLOROBENZENE	0.01	to	0.1	5/281	0.014 J	MR08-SS173	0.0025	5.6	Yes	(1) HQ above one, detected
HEXACHLOROBUTADIENE	0.01	to	0.1	1/281	0.014	MR08-SS173	--	NSV	Yes	(3) Detected, no screening value
HEXACHLOROCYCLOPENTADIENE	0.01	to	0.1	5/281	0.012 J	MR08-SS068	10	0.001	No	HQ less than one, detected
HEXACHLOROETHANE	0.34	to	3.5	0/281	--	--	0.1	35.0	Yes	(2) Not detected, HQ above one
INDENO(1,2,3-CD)PYRENE	0.01	to	0.1	217/281	19	MR08-SS325	--	NSV	Yes	(3) Detected, no screening value
ISOPHORONE	0.34	to	3.5	0/281	--	--	--	NSV	Yes	(4) Not detected, no screening value
NAPHTHALENE	0.01	to	0.1	52/280	0.11	MR08-SS325	0.1	1.1	Yes	(1) HQ above one, detected
NITROBENZENE	0.34	to	3.5	0/280	--	--	40	0.1	No	HQ less than one, not detected

TABLE 2
Surface Soil Screening - Step 2
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MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
N-NITROSO-DI-N-PROPYLAMINE	0.34	to	3.5	0/280	--	--	--	NSV	Yes	(4) Not detected, no screening value
N-NITROSODIPHENYLAMINE	0.67	to	6.9	0/280	--	--	20	0.3	No	HQ less than one, not detected
PENTACHLOROPHENOL	0.84	to	8.6	1/280	0.35 J	MR08-SS325	2.1	0.2	No	HQ less than one, detected
PHENANTHRENE	0.01	to	0.1	232/280	35	MR08-SS325	0.1	350.0	Yes	(1) HQ above one, detected
PHENOL	0.51	to	5.3	0/280	--	--	0.05	106.0	Yes	(2) Not detected, HQ above one
PYRENE	0.01	to	0.1	263/280	52	MR08-SS325	0.1	520.0	Yes	(1) HQ above one, detected
1,1,1-TRICHLOROETHANE	0.0047	to	0.91	0/306	--	--	0.1	9.1	Yes	(2) Not detected, HQ above one
1,1,2,2-TETRACHLOROETHANE	0.0047	to	0.91	0/304	--	--	0.1	9.1	Yes	(2) Not detected, HQ above one
TRIFLUOROETHANE(FREON-113)	0.0047	to	0.91	0/306	--	--	--	NSV	Yes	(4) Not detected, no screening value
1,1,2-TRICHLOROETHANE	0.0047	to	0.91	0/307	--	--	0.1	9.1	Yes	(2) Not detected, HQ above one
1,1-DICHLOROETHANE	0.0047	to	0.91	0/306	--	--	0.1	9.1	Yes	(2) Not detected, HQ above one
1,1-DICHLOROETHENE	0.0047	to	0.91	0/306	--	--	0.1	9.1	Yes	(2) Not detected, HQ above one
1,2-DIBROMO-3-CHLOROPROPANE	0.004	to	0.46	0/304	--	--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DIBROMOETHANE	0.0047	to	0.91	0/307	--	--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DICHLOROBENZENE	0.0047	to	0.91	1/304	0.00045 J	MR08-SS061	0.01	0.05	No	HQ less than one, detected
1,2-DICHLOROETHANE	0.0047	to	0.91	0/306	--	--	0.4	2.3	Yes	(2) Not detected, HQ above one
1,2-DICHLOROPROPANE	0.0047	to	0.91	0/306	--	--	700	0.001	No	HQ less than one, not detected
1,3-DICHLOROBENZENE	0.0047	to	0.91	0/304	--	--	0.01	91.0	Yes	(2) Not detected, HQ above one
2-BUTANONE	0.0081	to	0.91	128/306	0.069	MR08-SS332	--	NSV	Yes	(3) Detected, no screening value
2-HEXANONE	0.0079	to	0.91	11/307	0.025	MR08-SS188	--	NSV	Yes	(3) Detected, no screening value
4-METHYL-2-PENTANONE	0.0081	to	0.91	33/307	0.033	MR08-SS176	--	NSV	Yes	(3) Detected, no screening value
ACETONE	0.0079	to	0.86	173/308	1.8 J	MR08-SS081	--	NSV	Yes	(3) Detected, no screening value
BENZENE	0.0048	to	0.91	126/306	0.0095 J	MR08-SS115	0.05	0.2	No	HQ less than one, detected
BROMODICHLOROMETHANE	0.0047	to	0.91	2/307	0.0025 J	MR08-SS056	--	NSV	Yes	(3) Detected, no screening value
BROMOFORM	0.0047	to	0.91	0/307	--	--	--	NSV	Yes	(4) Not detected, no screening value
BROMOMETHANE	0.0079	to	0.91	0/306	--	--	--	NSV	Yes	(4) Not detected, no screening value
CARBON DISULFIDE	0.0047	to	0.91	58/306	0.01 J	MR08-SS139	--	NSV	Yes	(3) Detected, no screening value
CARBON TETRACHLORIDE	0.0047	to	0.91	0/306	--	--	1000	0.001	No	HQ less than one, not detected
CHLOROBENZENE	0.0047	to	0.91	1/307	0.011 J	MR08-SS056	0.05	0.2	No	HQ less than one, detected
CHLOROETHANE	0.0079	to	0.91	0/306	--	--	0.1	9.1	Yes	(2) Not detected, HQ above one
CHLOROFORM	0.0047	to	0.91	11/306	0.023 J	MR08-SS056	0.001	23.0	Yes	(1) HQ above one, detected
CHLOROMETHANE	0.0079	to	0.91	4/309	0.045 J	MR08-SS190	--	NSV	Yes	(3) Detected, no screening value
CIS-1,2-DICHLOROETHENE	0.0047	to	0.91	1/306	0.0051 J	MR08-SS056	--	NSV	Yes	(3) Detected, no screening value

TABLE 2
Surface Soil Screening - Step 2
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
CIS-1,3-DICHLOROPROPENE	0.0047	to	0.91	0/307	--	--	--	NSV	Yes	(4) Not detected, no screening value
CYCLOHEXANE	0.0082	to	0.91	45/306	0.0022 J	MR08-SS115	0.1	0.02	No	HQ less than one, detected
DIBROMOCHLOROMETHANE	0.0047	to	0.91	0/307	--	--	--	NSV	Yes	(4) Not detected, no screening value
12)	0.0079	to	0.91	0/306	--	--	--	NSV	Yes	(4) Not detected, no screening value
ETHYLBENZENE	0.0066	to	0.91	115/307	0.013	MR08-SS279	0.05	0.3	No	HQ less than one, detected
ISOPROPYLBENZENE (CUMENE)	0.0047	to	0.91	0/307	--	--	--	NSV	Yes	(4) Not detected, no screening value
METHYL ACETATE	0.0047	to	0.91	9/307	2.7 J	MR08-SS081	--	NSV	Yes	(3) Detected, no screening value
METHYLCYCLOHEXANE	0.0048	to	0.91	115/307	0.0024 J	MR08-SS115	--	NSV	Yes	(3) Detected, no screening value
METHYLENE CHLORIDE	0.0079	to	0.86	12/306	4.1	MR08-SS328	2	2.1	Yes	(1) HQ above one, detected
STYRENE	0.0047	to	0.91	4/307	0.016 J	MR08-SS052	0.1	0.2	No	HQ less than one, detected
TERT-BUTYL METHYL ETHER	0.0047	to	0.91	0/307	--	--	--	NSV	Yes	(4) Not detected, no screening value
TETRACHLOROETHENE	0.0047	to	0.91	1/307	0.0022 J	MR08-SS056	0.01	0.2	No	HQ less than one, detected
TOLUENE	0.0048	to	0.91	98/308	0.014 J	MR08-SS096	0.05	0.3	No	HQ less than one, detected
TRANS-1,2-DICHLOROETHENE	0.0047	to	0.91	0/306	--	--	0.1	9.1	Yes	(2) Not detected, HQ above one
TRANS-1,3-DICHLOROPROPENE	0.0047	to	0.91	0/307	--	--	--	NSV	Yes	(4) Not detected, no screening value
TRICHLOROETHENE	0.0047	to	0.91	6/306	0.006 J	MR08-SS207	0.001	6.0	Yes	(1) HQ above one, detected
TRICHLOROFLUOROMETHANE(FREON-11)	0.0079	to	0.91	1/306	0.0027 J	MR08-SS258	--	NSV	Yes	(3) Detected, no screening value
VINYL CHLORIDE	0.0079	to	0.91	1/306	0.0067 J	MR08-SS129	0.01	0.7	No	HQ less than one, detected
XYLENE, TOTAL	0.0047	to	0.91	7/307	0.022 J	MR08-SS204	0.05	0.4	No	HQ less than one, detected

Notes:

1 - Categories are assigned to those analytes retained as Step 2 COPCs and are as follows:

Category 1 – Contaminants with a maximum detection exceeding the ESV

Category 2 – Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV

Category 3 – Detected contaminants with no ESV

Category 4 – Undetected contaminants with no ESV

COPC - Contaminant of Potential Concern

ESV - Ecological Screening Value

HQ - Hazard Quotient

J - Analyte present, value may or may not be accurate or precise

mg/kg - millogram per kilogram

NSV - No Screening Value

Generated by: Sara Kent/ATL Checked by: Jon Weier/ATL

TABLE 3
Surface Water Screening - Step 2
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Chemical	Range of Non-Detect Values (mg/L)			Frequency of Detection	Maximum Concentration (mg/L)	Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/L)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
1,3,5-TRINITROBENZENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
1,3-DINITROBENZENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2,4,6-TRINITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2,4-DINITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2,6-DINITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2-AMINO-4,6-DINITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2-NITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
3-NITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
4-AMINO-2,6-DINITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROTOLUENE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
HMX	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
NITROBENZENE	0.000255	to	0.000266	0/3	--	--	0.27	0.001	No	HQ less than one, not detected
NITROGLYCERIN	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
PENTAERYTHRITOL TETRANITRATE	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
PERCHLORATE	--			3/3	0.0063	MR08-SW02	--	NSV	Yes	(3) Detected, no screening value
RDX	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TETRYL	0.000255	to	0.000266	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
ANTIMONY	0.00025	to	0.00025	0/3	--	--	0.16	0.002	No	HQ less than one, not detected
ARSENIC	--			3/3	0.00328	MR08-SW03	0.15	0.02	No	HQ less than one, detected
BARIUM	--			3/3	0.0391	MR08-SW03	--	NSV	Yes	(3) Detected, no screening value
CADMIUM	--			3/3	0.00199	MR08-SW03	0.00025	7.96	Yes	(1) HQ above one, detected
CHROMIUM	--			3/3	0.0172	MR08-SW02	0.074	0.23	No	HQ less than one, detected
COPPER	--			3/3	0.162	MR08-SW02	0.009	18.00	Yes	(1) HQ above one, detected
LEAD	--			3/3	0.0036	MR08-SW03	0.0025	1.44	Yes	(1) HQ above one, detected
MERCURY	0.0001	to	0.0001	0/3	--	--	0.00077	0.13	No	HQ less than one, not detected
SELENIUM	--			3/3	0.0065	MR08-SW02	0.005	1.30	Yes	(1) HQ above one, detected
SILVER	0.002	to	0.002	0/3	--	--	0.000012	166.67	Yes	(2) Not detected, HQ above one
ZINC	--			3/3	0.631	MR08-SW02	0.12	5.26	Yes	(1) HQ above one, detected
1,1-BIPHENYL	0.01	to	0.013	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
1,2,4-TRICHLOROBENZENE	0.001	to	0.001	0/3	--	--	0.0449	0.02	No	HQ less than one, not detected
1,4-DICHLOROBENZENE	0.001	to	0.001	0/3	--	--	0.0112	0.09	No	HQ less than one, not detected
2,2'-OXYBIS(1- CHLOROPROPANE)	0.01	to	0.013	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2,4,5-TRICHLOROPHENOL	0.024	to	0.033	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2,4,6-TRICHLOROPHENOL	0.01	to	0.013	0/3	--	--	0.0032	4.06	Yes	(2) Not detected, HQ above one
2,4-DICHLOROPHENOL	0.011	to	0.016	0/3	--	--	0.0365	0.44	No	HQ less than one, not detected
2,4-DIMETHYLPHENOL	0.011	to	0.016	0/3	--	--	0.0212	0.75	No	HQ less than one, not detected
2,4-DINITROPHENOL	0.043	to	0.06	0/3	--	--	0.0062	9.68	Yes	(2) Not detected, HQ above one
2-CHLORONAPHTHALENE	0.01	to	0.013	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
2-CHLOROPHENOL	0.011	to	0.016	0/3	--	--	0.0438	0.37	No	HQ less than one, not detected
2-METHYLNAPHTHALENE	0.00024	to	0.00033	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value

TABLE 3
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MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/L)			Frequency of Detection	Maximum Concentration (mg/L)		Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/L)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
2-METHYLPHENOL	0.011	to	0.016	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-NITROANILINE	0.024	to	0.033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-NITROPHENOL	0.01	to	0.013	0/3	--		--	3.5	0.004	No	HQ less than one, not detected
3,3'-DICHLOROBENZIDINE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
3-NITROANILINE	0.024	to	0.033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4,6-DINITRO-2-METHYLPHENOL	0.024	to	0.033	0/3	--		--	0.0023	14.35	Yes	(2) Not detected, HQ above one
4-BROMOPHENYL-PHENYLETHER	0.01	to	0.013	0/3	--		--	0.0122	1.07	Yes	(2) Not detected, HQ above one
4-CHLORO-3-METHYLPHENOL	0.01	to	0.013	0/3	--		--	0.0003	43.33	Yes	(2) Not detected, HQ above one
4-CHLOROANILINE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-CHLOROPHENYL-PHENYLETHER	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROANILINE	0.024	to	0.033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROPHENOL	0.024	to	0.033	0/3	--		--	0.0828	0.40	No	HQ less than one, not detected
ACENAPHTHENE	0.01	to	0.013	0/3	--		--	0.017	0.76	No	HQ less than one, not detected
ACENAPHTHYLENE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ACETOPHENONE	0.011	to	0.016	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ANTHRACENE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BENZO(A)ANTHRACENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BENZO(A)PYRENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BENZO(B)FLUORANTHENE	0.00026	to	0.00036	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BENZO(G,H,I)PERYLENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BENZO(K)FLUORANTHENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BIS(2-CHLOROETHOXY)METHANE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BIS(2-CHLOROETHYL)ETHER	0.01	to	0.013	0/3	--		--	2.38	0.01	No	HQ less than one, not detected
BIS(2-ETHYLHEXYL)PHTHALATE	0.01	to	0.01	1/3	0.002	J	MR08-SW03	0.0003	6.67	Yes	(1) HQ above one, detected
BUTYLBENZYLPHTHALATE	0.01	to	0.013	0/3	--		--	0.022	0.59	No	HQ less than one, not detected
CAPROLACTAM	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CARBAZOLE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CHRYSENE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DIBENZ(A,H)ANTHRACENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DIBENZOFURAN	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DIETHYLPHTHALATE	0.01	to	0.013	0/3	--		--	0.521	0.02	No	HQ less than one, not detected
DIMETHYL PHTHALATE	0.01	to	0.013	0/3	--		--	0.33	0.04	No	HQ less than one, not detected
DI-N-BUTYLPHTHALATE	0.01	to	0.013	0/3	--		--	0.0094	1.38	Yes	(2) Not detected, HQ above one
DI-N-OCTYLPHTHALATE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
FLUORANTHENE	0.00024	to	0.00033	0/3	--		--	0.0398	0.01	No	HQ less than one, not detected
FLUORENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
HEXACHLOROBENZENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
HEXACHLOROBUTADIENE	0.00026	to	0.00036	0/3	--		--	0.00093	0.39	No	HQ less than one, not detected
HEXACHLOROCYCLOPENTADIENE	0.00026	to	0.00036	0/3	--		--	0.00007	5.14	Yes	(2) Not detected, HQ above one
HEXACHLOROETHANE	0.01	to	0.013	0/3	--		--	0.0098	1.33	Yes	(2) Not detected, HQ above one

TABLE 3
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MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/L)			Frequency of Detection	Maximum Concentration (mg/L)		Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/L)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
INDENO(1,2,3-CD)PYRENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ISOPHORONE	0.01	to	0.013	0/3	--		--	1.17	0.01	No	HQ less than one, not detected
NAPHTHALENE	0.00024	to	0.00033	0/3	--		--	0.062	0.01	No	HQ less than one, not detected
N-NITROSO-DI-N-PROPYLAMINE	0.01	to	0.013	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
N-NITROSODIPHENYLAMINE	0.01	to	0.013	0/3	--		--	0.0585	0.22	No	HQ less than one, not detected
PENTACHLOROPHENOL	0.024	to	0.033	0/3	--		--	0.015	2.20	Yes	(2) Not detected, HQ above one
PHENANTHRENE	0.00024	to	0.00024	1/3	0.000072	J	MR08-SW03	--	NSV	Yes	(3) Detected, no screening value
PHENOL	0.01	to	0.013	0/3	--		--	0.256	0.05	No	HQ less than one, not detected
PYRENE	0.00024	to	0.00033	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1,1-TRICHLOROETHANE	0.001	to	0.001	0/3	--		--	0.528	0.002	No	HQ less than one, not detected
1,1,2,2-TETRACHLOROETHANE	0.001	to	0.001	0/3	--		--	0.24	0.004	No	HQ less than one, not detected
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (FREON-113)	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1,2-TRICHLOROETHANE	0.001	to	0.001	0/3	--		--	0.94	0.001	No	HQ less than one, not detected
1,1-DICHLOROETHANE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1-DICHLOROETHENE	0.001	to	0.001	0/3	--		--	0.303	0.003	No	HQ less than one, not detected
1,2-DIBROMO-3-CHLOROPROPANE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DIBROMOETHANE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DICHLOROBENZENE	0.001	to	0.001	0/3	--		--	0.0158	0.063	No	HQ less than one, not detected
1,2-DICHLOROETHANE	0.001	to	0.001	0/3	--		--	2	0.001	No	HQ less than one, not detected
1,2-DICHLOROPROPANE	0.001	to	0.001	0/3	--		--	0.525	0.002	No	HQ less than one, not detected
1,3-DICHLOROBENZENE	0.001	to	0.001	0/3	--		--	0.0502	0.020	No	HQ less than one, not detected
2-BUTANONE	0.003	to	0.003	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-HEXANONE	0.002	to	0.002	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-METHYL-2-PENTANONE	0.002	to	0.002	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ACETONE	--		--	3/3	0.015		MR08-SW03	--	NSV	Yes	(3) Detected, no screening value
BENZENE	0.001	to	0.001	0/3	--		--	0.053	0.019	No	HQ less than one, not detected
BROMODICHLOROMETHANE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BROMOFORM	0.001	to	0.001	0/3	--		--	0.293	0.003	No	HQ less than one, not detected
BROMOMETHANE	0.001	to	0.001	0/3	--		--	0.11	0.009	No	HQ less than one, not detected
CARBON DISULFIDE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CARBON TETRACHLORIDE	0.001	to	0.001	0/3	--		--	0.352	0.003	No	HQ less than one, not detected
CHLOROBENZENE	0.001	to	0.001	0/3	--		--	0.195	0.005	No	HQ less than one, not detected
CHLOROETHANE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CHLOROFORM	0.001	to	0.001	0/3	--		--	0.289	0.003	No	HQ less than one, not detected
CHLOROMETHANE	0.001	to	0.001	0/3	--		--	5.5	0.000	No	HQ less than one, not detected
CIS-1,2-DICHLOROETHENE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CIS-1,3-DICHLOROPROPENE	0.001	to	0.001	0/3	--		--	0.0244	0.041	No	HQ less than one, not detected
CYCLOHEXANE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DIBROMOCHLOROMETHANE	0.001	to	0.001	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value

TABLE 3
Surface Water Screening - Step 2
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MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/L)			Frequency of Detection	Maximum Concentration (mg/L)	Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/L)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
DICHLORODIFLUOROMETHANE (FREON-12)	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
ETHYLBENZENE	0.001	to	0.001	0/3	--	--	0.453	0.002	No	HQ less than one, not detected
ISOPROPYLBENZENE (CUMENE)	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
METHYL ACETATE	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
METHYLCYCLOHEXANE	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
METHYLENE CHLORIDE	0.001	to	0.001	0/3	--	--	1.93	0.001	No	HQ less than one, not detected
STYRENE	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TERT-BUTYL METHYL ETHER	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TETRACHLOROETHENE	0.001	to	0.001	0/3	--	--	0.084	0.012	No	HQ less than one, not detected
TOLUENE	0.001	to	0.001	0/3	--	--	0.175	0.006	No	HQ less than one, not detected
TRANS-1,2-DICHLOROETHENE	0.001	to	0.001	0/3	--	--	1.35	0.001	No	HQ less than one, not detected
TRANS-1,3-DICHLOROPROPENE	0.001	to	0.001	0/3	--	--	0.0244	0.04	No	HQ less than one, not detected
TRICHLOROETHENE	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TRICHLOROFLUOROMETHANE(FREON-11)	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
VINYL CHLORIDE	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
XYLENE, TOTAL	0.001	to	0.001	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value

Notes:

1 - Categories are assigned to those analytes retained as Step 2 COPCs and are as follows:

Category 1 – Contaminants with a maximum detection exceeding the ESV

Category 2 – Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV

Category 3 – Detected contaminants with no ESV

Category 4 – Undetected contaminants with no ESV

COPC - Contaminant of Potential Concern

ESV - Ecological Screening Value

HQ - Hazard Quotient

J - Analyte present, value may or may not be accurate or precise

mg/kg - millogram per kilogram

NSV - No Screening Value

Generated by: Sara Kent/ATL Checked by: Jon Weier/ATL

TABLE 4
Sediment Screening - Step 2
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)		Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
1,3,5-TRINITROBENZENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,3-DINITROBENZENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,4,6-TRINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,4-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,6-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-AMINO-4,6-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-NITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
3-NITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-AMINO-2,6-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROTOLUENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
HMX	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
NITROBENZENE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
NITROGLYCERIN	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
PENTAERYTHRITOL TETRANITRATE	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
PERCHLORATE	0.0027	to	0.005	1/3	0.00097	J	MR08-SD02	--	NSV	Yes	(3) Detected, no screening value
RDX	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
TETRYL	0.0982	to	0.0996	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ANTIMONY	--	to	--	3/3	9.56		MR08-SD01	2	4.78	Yes	(1) HQ above one, detected
ARSENIC	--	to	--	3/3	230	J	MR08-SD01	7.24	32	Yes	(1) HQ above one, detected
BARIUM	--	to	--	3/3	308		MR08-SD01	--	NSV	Yes	(3) Detected, no screening value
CADMIUM	--	to	--	3/3	2.77	J	MR08-SD01	0.676	4.10	Yes	(1) HQ above one, detected
CHROMIUM	--	to	--	3/3	46.5	J	MR08-SD01	52.3	0.89	No	HQ less than one, detected
COPPER	--	to	--	3/3	136	J	MR08-SD01	18.7	7.27	Yes	(1) HQ above one, detected
LEAD	--	to	--	3/3	61.7	J	MR08-SD01	30.2	2.04	Yes	(1) HQ above one, detected
MERCURY	0.0248	to	0.0248	2/3	0.214		MR08-SD01	0.13	1.65	Yes	(1) HQ above one, detected
SELENIUM	--	to	--	3/3	16.6	J	MR08-SD01	--	NSV	Yes	(3) Detected, no screening value
SILVER	0.241	to	0.241	2/3	0.432	J	MR08-SD01	0.733	0.59	No	HQ less than one, detected
ZINC	--	to	--	3/3	255	J	MR08-SD01	124	2.06	Yes	(1) HQ above one, detected
1,1-BIPHENYL	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,2,4-TRICHLOROBENZENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,4-DICHLOROBENZENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,2'-OXYBIS(1- CHLOROPROPANE)	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,4,5-TRICHLOROPHENOL	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value

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Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)		Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
2,4,6-TRICHLOROPHENOL	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,4-DICHLOROPHENOL	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,4-DIMETHYLPHENOL	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2,4-DINITROPHENOL	1.5	to	3.1	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-CHLORONAPHTHALENE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-CHLOROPHENOL	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-METHYLNAPHTHALENE	--	to	--	3/3	0.23	J	MR08-SD01	0.02	11.37	Yes	(1) HQ above one, detected
2-METHYLPHENOL	0.75	to	1.5	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-NITROANILINE	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-NITROPHENOL	0.75	to	1.5	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
3,3'-DICHLOROBENZIDINE	0.62	to	1.3	0/2	--		--	--	NSV	Yes	(4) Not detected, no screening value
3-NITROANILINE	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4,6-DINITRO-2-METHYLPHENOL	1.5	to	3.1	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-BROMOPHENYL-PHENYLETHER	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-CHLORO-3-METHYLPHENOL	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-CHLOROANILINE	0.62	to	1.3	0/2	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-CHLOROPHENYL-PHENYLETHER	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROANILINE	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-NITROPHENOL	1.5	to	3.1	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ACENAPHTHENE	0.41	to	0.85	0/3	--		--	0.01	126.68	Yes	(2) Not detected, HQ above one
ACENAPHTHYLENE	0.41	to	0.85	0/3	--		--	0.01	144.80	Yes	(2) Not detected, HQ above one
ACETOPHENONE	0.75	to	1.5	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ANTHRACENE	0.41	to	0.85	0/3	--		--	0.05	18.12	Yes	(2) Not detected, HQ above one
ATRAZINE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BENZALDEHYDE	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BENZO(A)ANTHRACENE	--	to	--	3/3	0.076		MR08-SD01	0.07	1.02	Yes	(1) HQ above one, detected
BENZO(A)PYRENE	0.012	to	0.012	2/3	0.062		MR08-SD01	0.09	0.70	No	HQ less than one, detected
BENZO(B)FLUORANTHENE	0.012	to	0.012	2/3	0.15		MR08-SD01	0.66	0.23	No	HQ less than one, detected
BENZO(G,H,I)PERYLENE	--	to	--	3/3	0.041		MR08-SD01	0.66	0.06	No	HQ less than one, detected
BENZO(K)FLUORANTHENE	0.012	to	0.012	2/3	0.066	J	MR08-SD01	0.66	0.10	No	HQ less than one, detected
BIS(2-CHLOROETHOXY)METHANE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BIS(2-CHLOROETHYL)ETHER	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BIS(2-ETHYLHEXYL)PHTHALATE	--	to	--	3/3	1.2	J	MR08-SD01	--	NSV	Yes	(3) Detected, no screening value

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Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)		Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
BUTYLBENZYLPHTHALATE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(2) Not detected, HQ above one
CAPROLACTAM	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CARBAZOLE	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CHRYSENE	0.41	to	0.85	0/3	--		--	0.11	7.87	Yes	(2) Not detected, HQ above one
DIBENZ(A,H)ANTHRACENE	0.012	to	0.026	0/3	--		--	0.01	4.18	Yes	(2) Not detected, HQ above one
DIBENZOFURAN	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DIETHYLPHTHALATE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DIMETHYL PHTHALATE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DI-N-BUTYLPHTHALATE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DI-N-OCTYLPHTHALATE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
FLUORANTHENE	--	to	--	3/3	0.21		MR08-SD01	0.11	1.86	Yes	(1) HQ above one, detected
FLUORENE	0.012	to	0.012	2/3	0.033		MR08-SD01	0.02	1.56	Yes	(1) HQ above one, detected
HEXACHLOROBENZENE	0.012	to	0.012	2/3	0.0092	J	MR08-SD01	--	NSV	Yes	(3) Detected, no screening value
HEXACHLOROBUTADIENE	0.012	to	0.026	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
HEXACHLOROCYCLOPENTADIENE	0.012	to	0.026	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
HEXACHLOROETHANE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
INDENO(1,2,3-CD)PYRENE	0.012	to	0.012	2/3	0.032		MR08-SD01	0.66	0.05	No	HQ less than one, detected
ISOPHORONE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
NAPHTHALENE	0.012	to	0.012	2/3	0.17	J	MR08-SD01	0.03	4.91	Yes	(1) HQ above one, detected
N-NITROSO-DI-N-PROPYLAMINE	0.41	to	0.85	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
N-NITROSODIPHENYLAMINE	0.82	to	1.7	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
PENTACHLOROPHENOL	1	to	2.1	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
PHENANTHRENE	--	to	--	3/3	0.38		MR08-SD01	0.09	4.38	Yes	(1) HQ above one, detected
PHENOL	0.62	to	1.3	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
PYRENE	--	to	--	3/3	0.14		MR08-SD01	0.15	0.92	No	HQ less than one, detected
1,1,1-TRICHLOROETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1,2,2-TETRACHLOROETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE(FREON-113)	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1,2-TRICHLOROETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1-DICHLOROETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,1-DICHLOROETHENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DIBROMO-3-CHLOROPROPANE	0.0069	to	0.015	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value

TABLE 4
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Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)		Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
1,2-DIBROMOETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DICHLOROBENZENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DICHLOROETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,2-DICHLOROPROPANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
1,3-DICHLOROBENZENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
2-BUTANONE	--	to	--	3/3	0.014	J	MR08-SD01	--	NSV	Yes	(3) Detected, no screening value
2-HEXANONE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
4-METHYL-2-PENTANONE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ACETONE	0.028	to	0.028	2/3	0.14		MR08-SD01	--	NSV	Yes	(3) Detected, no screening value
BENZENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BROMODICHLOROMETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BROMOFORM	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
BROMOMETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CARBON DISULFIDE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CARBON TETRACHLORIDE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CHLOROBENZENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CHLOROETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CHLOROFORM	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CHLOROMETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CIS-1,2-DICHLOROETHENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CIS-1,3-DICHLOROPROPENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
CYCLOHEXANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DIBROMOCHLOROMETHANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
DICHLORODIFLUOROMETHANE (FREON-12)	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ETHYLBENZENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
ISOPROPYLBENZENE (CUMENE)	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
METHYL ACETATE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
METHYLCYCLOHEXANE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
METHYLENE CHLORIDE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
STYRENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
TERT-BUTYL METHYL ETHER	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value
TETRACHLOROETHENE	0.014	to	0.03	0/3	--		--	--	NSV	Yes	(4) Not detected, no screening value

TABLE 4

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Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Ecological Screening Value (ESV) (mg/kg)	Maximum Hazard Quotient (HQ)	Step 2 COPC?[1]	
TOLUENE	0.014	to	0.03	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TRANS-1,2-DICHLOROETHENE	0.014	to	0.03	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TRANS-1,3-DICHLOROPROPENE	0.014	to	0.03	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TRICHLOROETHENE	0.014	to	0.03	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
TRICHLOROFLUOROMETHANE(FREON-11)	0.014	to	0.03	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
VINYL CHLORIDE	0.014	to	0.03	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value
XYLENE, TOTAL	0.014	to	0.03	0/3	--	--	--	NSV	Yes	(4) Not detected, no screening value

Notes:

1 - Categories are assigned to those analytes retained as Step 2 COPCs and are as follows:

Category 1 – Contaminants with a maximum detection exceeding the ESV

Category 2 – Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV

Category 3 – Detected contaminants with no ESV

Category 4 – Undetected contaminants with no ESV

COPC - Contaminant of Potential Concern

ESV - Ecological Screening Value

HQ - Hazard Quotient

J - Analyte present, value may or may not be accurate or precise

mg/kg - millogram per kilogram

NSV - No Screening Value

Generated by: Sara Kent/ATL Checked by: Jon Weier/ATL

TABLE 5
Surface Soil Screening - Step 3
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Arithmetic Mean (mg/kg)	Ecological Screening Value (ESV) (mg/kg)	Supplemental ESV	Supplemental ESV Source	Camp Lejuene Background Threshold Value (BTV) For Developed Areas	Maximum exceeds background?	Mean Hazard Quotient (HQ)	Step 3 COPC?	Rationale
ANTIMONY	1.57	to	2.41	60/84	10.7	MR08-SS096	1.338	78	--	--	1.72	Yes	0.02	No	HQ less than one
BARIUM	--	to	--	310/310	910	MR08-SS056	15.73	330	--	--	33.8	Yes	0.05	No	HQ less than one
CADMIUM	0.0757	to	0.22	273/310	11.3	MR08-SS056	0.5241	32	--	--	0.517	Yes	0.02	No	HQ less than one
CHROMIUM	0.76	to	0.836	303/310	147 J	MR08-SS056	7.414	26	--	--	23.1	Yes	0.29	No	HQ less than one
COPPER	1.58	to	1.72	79/84	184	MR08-SS056	7.196	28	--	--	2.5	Yes	0.26	No	HQ less than one
LEAD	--	to	--	310/310	435	MR08-SS134	48.74	120	--	--	20.2	Yes	0.41	No	HQ less than one
MERCURY	0.0962	to	0.224	121/310	9.22	MR08-SS056	0.09308	0.1	--	--	0.121	Yes	0.93	No	HQ less than one
SELENIUM	0.396	to	21.4	262/310	5.25 J	MR08-SS068	0.4768	0.52	--	--	0.896	Yes	0.92	No	HQ less than one
SILVER	0.361	to	1.78	159/310	108	MR08-SS056	0.9044	4.2	--	--	--	--	0.22	No	HQ less than one
ZINC	1.52	to	1.67	77/84	886 J	MR08-SS056	35.68	46	--	--	16.2	Yes	0.78	No	HQ less than one
2,4,5-TRICHLOROPHENOL	0.51	to	5.3	0/280	--	--	0.2973	4	--	--	--	--	0.07	No	Not detected
2,4-DICHLOROPHENOL	0.51	to	5.3	0/280	--	--	0.2974	0.003	--	--	--	--	99.1	No	Not detected
2,4-DIMETHYLPHENOL	0.51	to	5.3	0/279	--	--	0.2975	--	--	--	--	--	NSV	No	Not detected
2,4-DINITROTOLUENE	0.34	to	3.5	0/281	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected
2,6-DINITROTOLUENE	0.34	to	3.5	0/281	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected
2-CHLORONAPHTHALENE	0.34	to	3.5	0/280	--	--	0.1964	1	--	--	--	--	0.20	No	Not detected
2-CHLOROPHENOL	0.51	to	5.3	0/280	--	--	0.2974	0.01	--	--	--	--	29.74	No	Not detected
2-METHYLNAPHTHALENE	0.01	to	0.1	107/280	0.067	MR08-SS325	0.007027	--	3.24	USEPA, 2003	0.00152	Yes	0.002	No	HQ less than one
2-METHYLPHENOL	0.61	to	6.3	0/281	--	--	0.3568	0.5	--	--	--	--	0.71	No	Not detected
2-NITROANILINE	0.51	to	5.3	0/280	--	--	0.2973	--	--	--	--	--	NSV	No	Not detected
2-NITROPHENOL	0.61	to	6.3	0/280	--	--	0.3566	--	--	--	--	--	NSV	No	Not detected
3,3'-DICHLOROBENZIDINE	0.51	to	5.3	0/278	--	--	0.2968	--	--	--	--	--	NSV	No	Not detected
3-NITROANILINE	0.51	to	5.3	0/279	--	--	0.2966	--	--	--	--	--	NSV	No	Not detected
4,6-DINITRO-2-METHYLPHENOL	1.2	to	13	0/280	--	--	0.715	--	--	--	--	--	NSV	No	Not detected
4-BROMOPHENYL-PHENYLETHER	0.34	to	3.5	0/280	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected
4-CHLORO-3-METHYLPHENOL	0.51	to	5.3	0/280	--	--	0.2974	--	--	--	--	--	NSV	No	Not detected
4-CHLOROPHENYL-PHENYLETHER	0.34	to	3.5	0/280	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected
4-NITROANILINE	0.51	to	5.3	0/279	--	--	0.2966	--	--	--	--	--	NSV	No	Not detected
4-NITROPHENOL	1.2	to	13	0/280	--	--	0.7148	7	--	--	--	--	0.10	No	Not detected
ACENAPHTHYLENE	0.34	to	3.5	1/280	0.075 J	MR08-SS226	0.1961	--	--	--	0.00127	Yes	NSV	No	See Table 6
ACETOPHENONE	0.61	to	6.3	1/280	0.43 J	MR08-SS056	0.3567	--	--	--	--	--	NSV	No	Low frequency of detection
ANTHRACENE	0.34	to	3.5	7/280	3.3	MR08-SS325	0.2096	0.1	--	--	0.0021	Yes	2.10	No	Detection frequency less than 5 percent
ATRAZINE	0.34	to	3.5	0/280	--	--	0.1964	0.00005	--	--	--	--	3928.00	No	Not detected
BENZO(A)ANTHRACENE	0.01	to	0.1	237/280	25	MR08-SS325	0.202	--			0.0119	Yes	NSV	No	See Table 6
BENZO(A)PYRENE	0.01	to	0.1	211/280	26	MR08-SS325	0.2142	0.1	--	--	0.00582	Yes	2.14	No	See Table 6
BENZO(B)FLUORANTHENE	0.01	to	0.1	198/280	32	MR08-SS325	0.3085	--			0.0197	Yes	NSV	No	See Table 6
BENZO(G,H,I)PERYLENE	0.01	to	0.1	235/280	19	MR08-SS325	0.1635	--			0.0121	Yes	NSV	No	See Table 6
BENZO(K)FLUORANTHENE	0.01	to	0.1	195/280	26	MR08-SS325	0.2089	--			0.0164	Yes	NSV	No	See Table 6
BIS(2-CHLOROETHOXY)METHANE	0.34	to	3.5	0/280	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected
BIS(2-CHLOROETHYL)ETHER	0.34	to	3.5	0/280	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected
BIS(2-ETHYLHEXYL)PHTHALATE	0.34	to	3.5	142/280	3.9	MR08-SS056	0.2636	0.1	--	--	--	--	2.64	No	Low magnitude of exceedance; common lab contaminant
BUTYLBENZYLPHTHALATE	0.34	to	3.5	5/280	0.2 J	MR08-SS056	0.1956	0.1	--	--	--	--	1.96	No	Detection frequency less than 5 percent; common lab contaminant
CAPROLACTAM	0.51	to	5.3	0/280	--	--	0.2974	--	--	--	--	--	NSV	No	Not detected
CARBAZOLE	0.51	to	5.3	5/280	5	MR08-SS325	0.3161	--	--	--	--	--	NSV	No	Low frequency of detection
CHRYSENE	0.34	to	3.5	58/280	38	MR08-SS325	0.4141	--			0.0198	Yes	NSV	No	See Table 6
DIBENZ(A,H)ANTHRACENE	0.01	to	0.1	132/280	9.4	MR08-SS325	0.06856	--			0.00728	Yes	NSV	No	See Table 6
DIBENZOFURAN	0.34	to	3.5	2/280	0.53	MR08-SS325	0.1985	--	--	--	--	--	NSV	No	Low frequency of detection
DI-N-OCTYLPHTHALATE	0.34	to	3.5	0/280	--	--	0.1964	0.1	--	--	--	--	1.96	No	Not detected
FLUORANTHENE	0.01	to	0.1	253/281	80	MR08-SS325	0.5958	0.1	--	--	0.0417	Yes	5.96	No	See Table 6
HEXACHLOROBENZENE	0.01	to	0.1	5/281	0.014 J	MR08-SS173	0.006009	0.0025	--	--	--	--	2.40	No	Detection frequency less than 5 percent
HEXACHLOROBUTADIENE	0.01	to	0.1	1/281	0.014	MR08-SS173	0.006036	--	--	--	--	--	NSV	No	Low frequency of detection
HEXACHLOROETHANE	0.34	to	3.5	0/281	--	--	0.1964	0.1	--	--	--	--	1.96	No	Not detected
INDENO(1,2,3-CD)PYRENE	0.01	to	0.1	217/281	19	MR08-SS325	0.1624	--			0.0149	Yes	NSV	No	See Table 6
ISOPHORONE	0.34	to	3.5	0/281	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected
NAPHTHALENE	0.01	to	0.1	52/280	0.11	MR08-SS325	0.006807	0.1	--	--	0.00136	Yes	0.07	No	HQ less than one
N-NITROSO-DI-N-PROPYLAMINE	0.34	to	3.5	0/280	--	--	0.1964	--	--	--	--	--	NSV	No	Not detected

TABLE 5
Surface Soil Screening - Step 3
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Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Arithmetic Mean (mg/kg)	Ecological Screening Value (ESV) (mg/kg)	Supplemental ESV	Supplemental ESV Source	Camp Lejuene Background Threshold Value (BTV) For Developed Areas	Maximum exceeds background?	Mean Hazard Quotient (HQ)	Step 3 COPC?	Rationale
PHENANTHRENE	0.01	to	0.1	232/280	35	MR08-SS325	0.2433	0.1	--	--	0.00837	Yes	2.43	No	Low magnitude of exceedance; no food chain effects
PHENOL	0.51	to	5.3	0/280	--	--	0.2973	0.05	--	--	--	--	5.95	No	Not detected
PYRENE	0.01	to	0.1	263/280	52	MR08-SS325	0.4173	0.1	--	--	0.0318	Yes	4.17	No	See Table 6
1,1,1-TRICHLOROETHANE	0.0047	to	0.91	0/306	--	--	0.01159	0.1	--	--	--	--	0.12	No	Not detected
1,1,2,2-TETRACHLOROETHANE	0.0047	to	0.91	0/304	--	--	0.01157	0.1	--	--	--	--	0.12	No	Not detected
TRIFLUOROETHANE(FREON-113)	0.0047	to	0.91	0/306	--	--	0.01159	--	--	--	--	--	NSV	No	Not detected
1,1,2-TRICHLOROETHANE	0.0047	to	0.91	0/307	--	--	0.01158	0.1	--	--	--	--	0.12	No	Not detected
1,1-DICHLOROETHANE	0.0047	to	0.91	0/306	--	--	0.01159	0.1	--	--	--	--	0.12	No	Not detected
1,1-DICHLOROETHENE	0.0047	to	0.91	0/306	--	--	0.01159	0.1	--	--	--	--	0.12	No	Not detected
1,2-DIBROMO-3-CHLOROPROPANE	0.004	to	0.46	0/304	--	--	0.005854	--	--	--	--	--	NSV	No	Not detected
1,2-DIBROMOETHANE	0.0047	to	0.91	0/307	--	--	0.01158	--	--	--	--	--	NSV	No	Not detected
1,2-DICHLOROETHANE	0.0047	to	0.91	0/306	--	--	0.01159	0.4	--	--	--	--	0.03	No	Not detected
1,3-DICHLOROBENZENE	0.0047	to	0.91	0/304	--	--	0.01157	0.01	--	--	--	--	1.16	No	Not detected
2-BUTANONE	0.0081	to	0.91	128/306	0.069	MR08-SS332	0.01425	--	--	--	--	--	NSV	No	Common lab contaminant
2-HEXANONE	0.0079	to	0.91	11/307	0.025	MR08-SS188	0.0118	--	--	--	--	--	NSV	No	Low frequency of detection
4-METHYL-2-PENTANONE	0.0081	to	0.91	33/307	0.033	MR08-SS176	0.0114	--	443	USEPA, 2003	--	--	0.00003	No	HQ less than one
ACETONE	0.0079	to	0.86	173/308	1.8 J	MR08-SS081	0.119	--	--	--	--	--	NSV	No	Common lab contaminant
BROMODICHLOROMETHANE	0.0047	to	0.91	2/307	0.0025 J	MR08-SS056	0.01154	--	--	--	--	--	NSV	No	Low frequency of detection
BROMOFORM	0.0047	to	0.91	0/307	--	--	0.01158	--	--	--	--	--	NSV	No	Not detected
BROMOMETHANE	0.0079	to	0.91	0/306	--	--	0.01165	--	--	--	--	--	NSV	No	Not detected
CARBON DISULFIDE	0.0047	to	0.91	58/306	0.01 J	MR08-SS139	0.01102	--	0.0941	USEPA, 2003	--	--	0.1	No	HQ less than one
CHLOROETHANE	0.0079	to	0.91	0/306	--	--	0.01165	0.1	--	--	--	--	0.12	No	Not detected
CHLOROFORM	0.0047	to	0.91	11/306	0.023 J	MR08-SS056	0.01149	0.001	--	--	--	--	11.49	No	Detection frequency less than 5 percent
CHLOROMETHANE	0.0079	to	0.91	4/309	0.045 J	MR08-SS190	0.01178	--	--	--	--	--	NSV	No	Low frequency of detection
CIS-1,2-DICHLOROETHENE	0.0047	to	0.91	1/306	0.0051 J	MR08-SS056	0.01158	--	--	--	--	--	NSV	No	Low frequency of detection
CIS-1,3-DICHLOROPROPENE	0.0047	to	0.91	0/307	--	--	0.01158	--	--	--	--	--	NSV	No	Not detected
DIBROMOCHLOROMETHANE	0.0047	to	0.91	0/307	--	--	0.01158	--	--	--	--	--	NSV	No	Not detected
DICHLORODIFLUOROMETHANE (FREON-12)	0.0079	to	0.91	0/306	--	--	0.01165	--	--	--	--	--	NSV	No	Not detected
ISOPROPYLBENZENE (CUMENE)	0.0047	to	0.91	0/307	--	--	0.01158	--	--	--	--	--	NSV	No	Not detected
METHYL ACETATE	0.0047	to	0.91	9/307	2.7 J	MR08-SS081	0.02287	--	--	--	--	--	NSV	No	Low frequency of detection
METHYLCYCLOHEXANE	0.0048	to	0.91	115/307	0.0024 J	MR08-SS115	0.009613	--	--	--	--	--	NSV	No	No screening value, uncertainty
METHYLENE CHLORIDE	0.0079	to	0.86	12/306	4.1	MR08-SS328	0.02371	2	--	--	--	--	0.01	No	HQ less than one
TERT-BUTYL METHYL ETHER	0.0047	to	0.91	0/307	--	--	0.01158	--	--	--	--	--	NSV	No	Not detected
TRANS-1,2-DICHLOROETHENE	0.0047	to	0.91	0/306	--	--	0.01159	0.1	--	--	--	--	0.12	No	Not detected
TRANS-1,3-DICHLOROPROPENE	0.0047	to	0.91	0/307	--	--	0.01158	--	--	--	--	--	NSV	No	Not detected
TRICHLOROETHENE	0.0047	to	0.91	6/306	0.006 J	MR08-SS207	0.0115	0.001	--	--	--	--	11.50	No	Detection frequency less than 5 percent
TRICHLOROFLUOROMETHANE(FREON-11)	0.0079	to	0.91	1/306	0.0027 J	MR08-SS258	0.01164	--	--	--	--	--	NSV	No	Low frequency of detection

Notes:
COPC - Contaminant of Potential Concern
EPC - Exposure Point Concentration
ESV - Ecological Screening Value
HQ - Hazard Quotient
J - Analyte present, value may or may not be accurate or precise
NSV - No Screening Value
UCL - Upper Confidence Limit
mg/kg - milligrams per kilogram
Generated by: Sara Kent/ATL Checked by: Jon Weier/ATL

TABLE 6
Surface Soil Screening - Step 3 PAHs
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical[1]	Sample with Highest Summed Concentration (MR08-SS325) (mg/kg)	Sample with Second highest Summed Concentration (MR08-SS185) (mg/kg)	Sample with Third Highest Summed Concentration (MR08-SS372) (mg/kg)	Ecological Screening Value (ESV) (mg/kg)	Hazard Quotient (HQ) Based on Highest Sample Concentration (MR08-SS325)	HQ Based on Second Highest Sample Concentrations (MR08-SS185)	HQ Based on Third Highest Sample Concentrations (MR08-SS372)	Step 3 COPC?	Rationale
Sum of Low Molecular Weight PAHs	40.68	13.38	2.28	29	1.40	0.46	0.08	No	Maximum HQ is less than one when sample MR08-SS325 was removed.
Sum of High Molecular Weight PAHs	326.4	61	37.18	18	18.13	3.40	2.07	No	Magnitude of exceedance is low based on third highest sample.

Notes:

[1] Low molecular weight PAHs include: acenapthene, acenaphthylene, anthracene, fluorene, and phenanthrene. High molecular weight PAHs include: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene.

COPC - Contaminant of Potential Concern

ESV - Ecological Screening Value

HQ - Hazard Quotient

J - Analyte present, value may or may not be accurate or precise

mg/kg - milligrams per kilogram

TABLE 7
Surface Water Screening - Step 3
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/L)			Frequency of Detection	Maximum Concentration (mg/L)		Sample ID of Maximum Detected Concentration	Arithmetic Mean (mg/L)	Ecological Screening Value (ESV) (mg/L)	Supplemental ESV	Supplemental ESV Source	Mean Hazard Quotient (HQ)	Step 3 COPC?	Rationale
1,3,5-TRINITROBENZENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
1,3-DINITROBENZENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
2,4,6-TRINITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
2,4-DINITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
2,6-DINITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
2-AMINO-4,6-DINITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
2-NITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
3-NITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
4-AMINO-2,6-DINITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
4-NITROTOLUENE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
HMX	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
NITROGLYCERIN	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
PENTAERYTHRITOL TETRANITRATE	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
PERCHLORATE	--		--	3/3	0.0063		MR08-SW02	0.0057	--	0.023	USACHPPM, 2007	0.25	No	HQ less than 1
RDX	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
TETRYL	0.000255	to	0.000266	0/3	--		--	0.0001302	--	--	--	NSV	No	Not detected
BARIUM	--		--	3/3	0.0391		MR08-SW03	0.03183	--	0.22	USEPA, 2003	0.14	No	HQ less than 1
CADMIUM	--		--	3/3	0.00199		MR08-SW03	0.001703	0.00025	--	--	6.81	No	See text
COPPER	--		--	3/3	0.162		MR08-SW02	0.1423	0.009	--	--	15.81	No	See text
LEAD	--		--	3/3	0.0036		MR08-SW03	0.00264	0.0025	--	--	1.06	No	Low magnitude of exceedance; no food chain effects
SELENIUM	--		--	3/3	0.0065		MR08-SW02	0.005517	0.005	--	--	1.10	No	Low magnitude of exceedance
SILVER	0.002	to	--	0/3	--		--	0.001	0.000012	--	--	83.33	No	Not detected
ZINC	--		--	3/3	0.631		MR08-SW02	0.5957	0.12	--	--	4.96	No	See text
1,1-BIPHENYL	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
2,2'-OXYBIS(1- CHLOROPROPANE)	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
2,4,5-TRICHLOROPHENOL	0.024	to	0.033	0/3	--		--	0.0135	--	--	--	NSV	No	Not detected
2,4,6-TRICHLOROPHENOL	0.01	to	0.013	0/3	--		--	0.0055	0.0032	--	--	1.72	No	Not detected
2,4-DINITROPHENOL	0.043	to	0.06	0/3	--		--	0.0245	0.0062	--	--	3.95	No	Not detected
2-CHLORONAPHTHALENE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
2-METHYLNAPHTHALENE	0.00024	to	0.00033	0/3	--		--	0.000135	--	--	--	NSV	No	Not detected
2-METHYLPHENOL	0.011	to	0.016	0/3	--		--	0.0065	--	--	--	NSV	No	Not detected
2-NITROANILINE	0.024	to	0.033	0/3	--		--	0.0135	--	--	--	NSV	No	Not detected
3,3'-DICHLOROBENZIDINE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
3-NITROANILINE	0.024	to	0.033	0/3	--		--	0.0135	--	--	--	NSV	No	Not detected
4,6-DINITRO-2-METHYLPHENOL	0.024	to	0.033	0/3	--		--	0.0135	0.0023	--	--	5.87	No	Not detected
4-BROMOPHENYL-PHENYLETHER	0.01	to	0.013	0/3	--		--	0.0055	0.0122	--	--	0.45	No	Not detected
4-CHLORO-3-METHYLPHENOL	0.01	to	0.013	0/3	--		--	0.0055	0.0003	--	--	18.33	No	Not detected
4-CHLOROANILINE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
4-CHLOROPHENYL-PHENYLETHER	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
4-NITROANILINE	0.024	to	0.033	0/3	--		--	0.0135	--	--	--	NSV	No	Not detected
ACENAPHTHYLENE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
ACETOPHENONE	0.011	to	0.016	0/3	--		--	0.0065	--	--	--	NSV	No	Not detected
ANTHRACENE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
BENZO(A)ANTHRACENE	0.00024	to	0.00033	0/3	--		--	0.000135	--	--	--	NSV	No	Not detected
BENZO(A)PYRENE	0.00024	to	0.00033	0/3	--		--	0.000135	--	--	--	NSV	No	Not detected
BENZO(B)FLUORANTHENE	0.00026	to	0.00036	0/3	--		--	0.0001467	--	--	--	NSV	No	Not detected
BENZO(G,H,I)PERYLENE	0.00024	to	0.00033	0/3	--		--	0.000135	--	--	--	NSV	No	Not detected
BENZO(K)FLUORANTHENE	0.00024	to	0.00033	0/3	--		--	0.000135	--	--	--	NSV	No	Not detected
BIS(2-CHLOROETHOXY)METHANE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
BIS(2-ETHYLHEXYL)PHTHALATE	0.01	to	0.01	1/3	0.002	J	MR08-SW03	0.004	0.0003	--	--	13.33	No	Common lab contaminant
CAPROLACTAM	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
CARBAZOLE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
CHRYSENE	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
DIBENZ(A,H)ANTHRACENE	0.00024	to	0.00033	0/3	--		--	0.000135	--	--	--	NSV	No	Not detected
DIBENZOFURAN	0.01	to	0.013	0/3	--		--	0.0055	--	--	--	NSV	No	Not detected
DI-N-BUTYLPHTHALATE	0.01	to	0.013	0/3	--		--	0.0055	0.0094	--	--	0.59	No	Not detected

TABLE 7
Surface Water Screening - Step 3
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/L)			Frequency of Detection	Maximum Concentration (mg/L)	Sample ID of Maximum Detected Concentration	Arithmetic Mean (mg/L)	Ecological Screening Value (ESV) (mg/L)	Supplemental ESV	Supplemental ESV Source	Mean Hazard Quotient (HQ)	Step 3 COPC?	Rationale
DI-N-OCTYLPHTHALATE	0.01	to	0.013	0/3	--	--	0.0055	--	--	--	NSV	No	Not detected
FLUORENE	0.00024	to	0.00033	0/3	--	--	0.000135	--	--	--	NSV	No	Not detected
HEXACHLOROBENZENE	0.00024	to	0.00033	0/3	--	--	0.000135	--	--	--	NSV	No	Not detected
HEXACHLOROCYCLOPENTADIENE	0.00026	to	0.00036	0/3	--	--	0.0001467	0.00007	--	--	2.10	No	Not detected
HEXACHLOROETHANE	0.01	to	0.013	0/3	--	--	0.0055	0.0098	--	--	0.56	No	Not detected
INDENO(1,2,3-CD)PYRENE	0.00024	to	0.00033	0/3	--	--	0.000135	--	--	--	NSV	No	Not detected
N-NITROSO-DI-N-PROPYLAMINE	0.01	to	0.013	0/3	--	--	0.0055	--	--	--	NSV	No	Not detected
PENTACHLOROPHENOL	0.024	to	0.033	0/3	--	--	0.0135	0.015	--	--	0.90	No	Not detected
PHENANTHRENE	0.00024	to	0.00024	1/3	0.000072 J	MR08-SW03	0.000104	--	0.0036	USEPA, 2003	0.03	No	HQ less than 1
PYRENE	0.00024	to	0.00033	0/3	--	--	0.000135	--	--	--	NSV	No	Not detected
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (FREON-113)	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
1,1-DICHLOROETHANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
1,2-DIBROMO-3-CHLOROPROPANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
1,2-DIBROMOETHANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
2-BUTANONE	0.003	to	0.003	0/3	--	--	0.0015	--	--	--	NSV	No	Not detected
2-HEXANONE	0.002	to	0.002	0/3	--	--	0.001	--	--	--	NSV	No	Not detected
4-METHYL-2-PENTANONE	0.002	to	0.002	0/3	--	--	0.001	--	--	--	NSV	No	Not detected
ACETONE	--	to	--	3/3	0.015	MR08-SW03	0.0106	--			NSV	No	Common lab contaminant
BROMODICHLOROMETHANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
CARBON DISULFIDE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
CHLOROETHANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
CIS-1,2-DICHLOROETHENE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
CYCLOHEXANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
DIBROMOCHLOROMETHANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
DICHLORODIFLUOROMETHANE (FREON-12)	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
ISOPROPYLBENZENE (CUMENE)	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
METHYL ACETATE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
METHYLCYCLOHEXANE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
STYRENE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
TERT-BUTYL METHYL ETHER	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
TRICHLOROETHENE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
TRICHLOROFLUOROMETHANE(FREON-11)	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
VINYL CHLORIDE	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected
XYLENE, TOTAL	0.001	to	0.001	0/3	--	--	0.0005	--	--	--	NSV	No	Not detected

Notes:
COPC - Contaminant of Potential Concern
EPC - Exposure Point Concentration
ESV - Ecological Screening Value
HQ - Hazard Quotient
J - Analyte present, value may or may not be accurate or precise
NSV - No Screening Value
UCL - Upper Confidence Limit
mg/kg - milligrams per kilogram
Generated by: Sara Kent/ATL Checked by: Jon Weier/ATL

TABLE 8
Sediment Screening - Step 3
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)		Sample ID of Maximum Detected Concentration	Arithmetic Mean (mg/kg)	Ecological Screening Value (ESV) (mg/kg)	Supplemental ESV	Supplemental ESV Source	Mean Hazard Quotient (HQ)	Step 3 COPC?	Rationale
1,3,5-TRINITROBENZENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
1,3-DINITROBENZENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
2,4,6-TRINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
2,4-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
2,6-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
2-AMINO-4,6-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
2-NITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
3-NITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
4-AMINO-2,6-DINITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
4-NITROTOLUENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
HMX	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
NITROBENZENE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
NITROGLYCERIN	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
PENTAERYTHRITOL TETRANITRATE	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
PERCHLORATE	0.0027	to	0.005	1/3	0.00097	J	MR08-SD02	0.001607	--	--	--	NSV	No	No screening level, uncertainty
RDX	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
TETRYL	0.0982	to	0.0996	0/3	--		--	0.0495	--	--	--	NSV	No	Not detected
ANTIMONY	--	to	--	3/3	9.56		MR08-SD01	4.353	2	--	--	2.18	No	Low magnitude of exceedance
ARSENIC	--	to	--	3/3	230	J	MR08-SD01	97.41	7.24	--	--	13.45	No	See text
BARIUM	--	to	--	3/3	308		MR08-SD01	151.4	--	--	--	NSV	No	No screening level, uncertainty
CADMIUM	--	to	--	3/3	2.77	J	MR08-SD01	1.321	0.676	--	--	1.95	No	Low magnitude of exceedance; no food chain effects
COPPER	--	to	--	3/3	136	J	MR08-SD01	62	18.7	--	--	3.32	No	No food chain effects. Not significnat habitat.
LEAD	--	to	--	3/3	61.7	J	MR08-SD01	31.93	30.2	--	--	1.06	No	Low magnitude of exceedance; no food chain effects
MERCURY	0.0248	to	0.0248	2/3	0.214		MR08-SD01	0.0935	0.13	--	--	0.72	No	HQ less than one
SELENIUM	--	to	--	3/3	16.6	J	MR08-SD01	7.944	--	2	USEPA, 2006a	4	No	See text
ZINC	--	to	--	3/3	255	J	MR08-SD01	122.8	124	--	--	0.99	No	HQ less than one
1,1-BIPHENYL	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
1,2,4-TRICHLOROBENZENE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,4-DICHLOROBENZENE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
2,2'-OXYBIS(1- CHLOROPROPANE)	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
2,4,5-TRICHLOROPHENOL	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
2,4,6-TRICHLOROPHENOL	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
2,4-DICHLOROPHENOL	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
2,4-DIMETHYLPHENOL	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
2,4-DINITROPHENOL	1.5	to	3.1	0/3	--		--	1.033	--	--	--	NSV	No	Not detected
2-CHLORONAPHTHALENE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
2-CHLOROPHENOL	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
2-METHYLNAPHTHALENE	--	to	--	3/3	0.23	J	MR08-SD01	0.1151	0.02	--	--	5.69	No	See text
2-METHYLPHENOL	0.75	to	1.5	0/3	--		--	0.5133	--	--	--	NSV	No	Not detected
2-NITROANILINE	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
2-NITROPHENOL	0.75	to	1.5	0/3	--		--	0.5133	--	--	--	NSV	No	Not detected
3,3'-DICHLOROBENZIDINE	0.62	to	1.3	0/2	--		--	0.48	--	--	--	NSV	No	Not detected
3-NITROANILINE	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
4,6-DINITRO-2-METHYLPHENOL	1.5	to	3.1	0/3	--		--	1.033	--	--	--	NSV	No	Not detected
4-BROMOPHENYL-PHENYLETHER	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
4-CHLORO-3-METHYLPHENOL	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
4-CHLOROANILINE	0.62	to	1.3	0/2	--		--	0.48	--	--	--	NSV	No	Not detected
4-CHLOROPHENYL-PHENYLETHER	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
4-NITROANILINE	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected

TABLE 8
Sediment Screening - Step 3
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Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)		Sample ID of Maximum Detected Concentration	Arithmetic Mean (mg/kg)	Ecological Screening Value (ESV) (mg/kg)	Supplemental ESV	Supplemental ESV Source	Mean Hazard Quotient (HQ)	Step 3 COPC?	Rationale
4-NITROPHENOL	1.5	to	3.1	0/3	--		--	1.033	--	--	--	NSV	No	Not detected
ACENAPHTHENE	0.41	to	0.85	0/3	--		--	0.285	0.01	--	--	42.47	No	Not detected
ACENAPHTHYLENE	0.41	to	0.85	0/3	--		--	0.285	0.01	--	--	48.55	No	Not detected
ACETOPHENONE	0.75	to	1.5	0/3	--		--	0.5133	--	--	--	NSV	No	Not detected
ANTHRACENE	0.41	to	0.85	0/3	--		--	0.285	0.05	--	--	6.08	No	Not detected
ATRAZINE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
BENZALDEHYDE	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
BENZO(A)ANTHRACENE	--	to	--	3/3	0.076		MR08-SD01	0.03897	0.07	--	--	0.52	No	HQ less than one
BIS(2-CHLOROETHOXY)METHANE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
BIS(2-CHLOROETHYL)ETHER	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
BIS(2-ETHYLHEXYL)PHTHALATE	--	to	--	3/3	1.2	J	MR08-SD01	0.5	--	--	--	NSV	No	Common lab contaminant
BUTYLBENZYLPHTHALATE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
CAPROLACTAM	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
CARBAZOLE	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
CHRYSENE	0.41	to	0.85	0/3	--		--	0.285	0.11	--	--	2.64	No	Not detected
DIBENZ(A,H)ANTHRACENE	0.012	to	0.026	0/3	--		--	0.008667	0.01	--	--	1.39	No	Not detected
DIBENZOFURAN	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
DIETHYLPHTHALATE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
DIMETHYL PHTHALATE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
DI-N-BUTYLPHTHALATE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
DI-N-OCTYLPHTHALATE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
FLUORANTHENE	--	to	--	3/3	0.21		MR08-SD01	0.12	0.11	--	--	1.06	No	Low magnitude of exceedance; no food chain effects
FLUORENE	0.012	to	0.012	2/3	0.033		MR08-SD01	0.019	0.02	--	--	0.90	No	HQ less than one
HEXACHLOROBENZENE	0.012	to	0.012	2/3	0.0092	J	MR08-SD01	0.0062	--	0.02	USEPA, 2003	0.31	No	HQ less than one
HEXACHLOROBUTADIENE	0.012	to	0.026	0/3	--		--	0.008667	--	--	--	NSV	No	Not detected
HEXACHLOROCYCLOPENTADIENE	0.012	to	0.026	0/3	--		--	0.008667	--	--	--	NSV	No	Not detected
HEXACHLOROETHANE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
ISOPHORONE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
NAPHTHALENE	0.012	to	0.012	2/3	0.17	J	MR08-SD01	0.09533	0.03	--	--	2.76	No	Low magnitude of exceedance
N-NITROSO-DI-N-PROPYLAMINE	0.41	to	0.85	0/3	--		--	0.285	--	--	--	NSV	No	Not detected
N-NITROSODIPHENYLAMINE	0.82	to	1.7	0/3	--		--	0.5717	--	--	--	NSV	No	Not detected
PENTACHLOROPHENOL	1	to	2.1	0/3	--		--	0.7	--	--	--	NSV	No	Not detected
PHENANTHRENE	--	to	--	3/3	0.38		MR08-SD01	0.182	0.09	--	--	2.10	No	Low magnitude of exceedance; no food chain effects
PHENOL	0.62	to	1.3	0/3	--		--	0.435	--	--	--	NSV	No	Not detected
1,1,1-TRICHLOROETHANE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,1,2,2-TETRACHLOROETHANE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE(FREON-113)	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,1,2-TRICHLOROETHANE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,1-DICHLOROETHANE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,1-DICHLOROETHENE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,2-DIBROMO-3-CHLOROPROPANE	0.0069	to	0.015	0/3	--		--	0.004917	--	--	--	NSV	No	Not detected
1,2-DIBROMOETHANE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,2-DICHLOROBENZENE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,2-DICHLOROETHANE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,2-DICHLOROPROPANE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
1,3-DICHLOROBENZENE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
2-BUTANONE	--	to	--	3/3	0.014	J	MR08-SD01	0.006433	--	--	--	NSV	No	Common lab contaminant
2-HEXANONE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected
4-METHYL-2-PENTANONE	0.014	to	0.03	0/3	--		--	0.009833	--	--	--	NSV	No	Not detected

TABLE 8
Sediment Screening - Step 3
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Chemical	Range of Non-Detect Values (mg/kg)			Frequency of Detection	Maximum Concentration (mg/kg)	Sample ID of Maximum Detected Concentration	Arithmetic Mean (mg/kg)	Ecological Screening Value (ESV) (mg/kg)	Supplemental ESV	Supplemental ESV Source	Mean Hazard Quotient (HQ)	Step 3 COPC?	Rationale
ACETONE	0.028	to	0.028	2/3	0.14	MR08-SD01	0.06233	--	--	--	NSV	No	Common lab contaminant
BENZENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
BROMODICHLOROMETHANE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
BROMOFORM	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
BROMOMETHANE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CARBON DISULFIDE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CARBON TETRACHLORIDE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CHLOROBENZENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CHLOROETHANE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CHLOROFORM	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CHLOROMETHANE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CIS-1,2-DICHLOROETHENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CIS-1,3-DICHLOROPROPENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
CYCLOHEXANE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
DIBROMOCHLOROMETHANE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
DICHLORODIFLUOROMETHANE (FREON-12)	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
ETHYLBENZENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
ISOPROPYLBENZENE (CUMENE)	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
METHYL ACETATE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
METHYLCYCLOHEXANE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
METHYLENE CHLORIDE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
STYRENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
TERT-BUTYL METHYL ETHER	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
TETRACHLOROETHENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
TOLUENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
TRANS-1,2-DICHLOROETHENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
TRANS-1,3-DICHLOROPROPENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
TRICHLOROETHENE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
TRICHLOROFLUOROMETHANE(FREON-11)	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
VINYL CHLORIDE	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected
XYLENE, TOTAL	0.014	to	0.03	0/3	--	--	0.009833	--	--	--	NSV	No	Not detected

Notes:

COPC - Contaminant of Potential Concern
EPC - Exposure Point Concentration
ESV - Ecological Screening Value
HQ - Hazard Quotient
J - Analyte present, value may or may not be accurate or precise

NSV - No Screening Value
UCL - Upper Confidence Limit
mg/kg - milligrams per kilogram
Generated by: Sara Kent/ATL
Checked by: Jon Weier/ATL

TABLE 9

Exposure Parameters for Upper Trophic Level Terrestrial Ecological Receptors

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, Jacksonville, North Carolina

	Minimum Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Dietary Composition (percent)									Soil/ Sediment Ingestion	
Receptor	Value	Reference	Value	Reference	Value	Reference	Terr Plants	Terr Inv	Mouse	Vole	Shrew	Aq Plants	Aq Inv	Fish	Reference	Value	Reference
Mammals																	
Raccoon	4.2300	Silva and Downing 1995	0.60919	allometric equation	0.13067	Conover 1989	0.0	0.0	0.0	0.0	0.0	40.0	43.6	7.0	USEPA 1993	9.4	Beyer et al. 1994
Red fox	3.1700	Silva and Downing 1995	0.41154	allometric equation	0.14763	Sample and Suter 1994	7.0	2.8	29.2	29.1	29.1	0.0	0.0	0.0	USEPA 1993	2.8	Beyer et al. 1994
White-footed mouse	0.0141	Silva and Downing 1995	0.00915	Sample and Suter 1994	0.00073	Sample and Suter 1994	51.0	47.0	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951; Sample and Suter 1994	2.0	Beyer et al. 1994
Birds																	
American robin	0.0635	USEPA 1993	0.01287	allometric equation	0.00736	Levey and Karasov 1989	51.9	43.5	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951	4.6	Sample and Suter 1994
Belted kingfisher	0.1250	Dunning 1993	0.02107	allometric equation	0.02619	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	16.0	84.0	USEPA 1993	0.0	Sample and Suter 1994
Marsh wren	0.0098	Dunning 1993	0.00330	allometric equation	0.00298	USEPA 1993	0.0	0.0	0.0	0.0	0.0	0.0	95.0	0.0	USEPA 1993	5.0	Assumed based on diet
Mourning dove	0.1050	Tomlinson et al. 1994	0.01750	allometric equation	0.02090	allometric equation	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Tomlinson et al. 1994	5.0	Assumed based on diet

Generated by: Sara Kent/ATL Checked by: Jon Weier/ATL

TABLE 10

Bioaccumulation Factors for Food Items

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, Jacksonville, North Carolina

	Soil-Biota BAF (dry weight)			Regression		
	Value	*Basis*	*Reference*	*B0*	*B1*	*Reference*
Terrestrial Plants						
Arsenic	--	--	--	-1.992	0.564	Bechtel Jacobs 1998a
Cadmium	--	--	--	-0.476	0.546	Bechtel Jacobs 1998a
Chromium	0.041	Median	Bechtel Jacobs 1998a			
Copper				0.669	0.394	Bechtel Jacobs 1998a
Lead	--	--	--	-1.328	0.561	Bechtel Jacobs 1998a
Mercury	--	--	--	0.669	0.394	Bechtel Jacobs 1998a
Selenium	--	--	--	-0.678	1.104	Bechtel Jacobs 1998a
Silver	0.014	Median	Bechtel Jacobs 1998a	--	--	--
Zinc	0.025	90th percentile	Bechtel Jacobs 1998a	--	--	--
Acenaphthylene	--	--	--	-1.144	0.791	USEPA 2007a
Anthracene	--	--	--	-0.989	0.778	USEPA 2007a
Benzo(a)anthracene	--	--	--	-2.708	0.594	USEPA 2007a
Benzo(a)pyrene	--	--	--	-2.062	0.975	USEPA 2007a
Benzo(b)fluoranthene	0.310	Median	USEPA 2007a	--	--	--
Benzo(g,h,i)perylene	--	--	--	-0.931	1.183	USEPA 2007a
Benzo(k)fluoranthene	--	--	--	-2.158	0.860	USEPA 2007a
Chrysene	--	--	--	-2.708	0.594	USEPA 2007a
Dibenz(a,h)anthracene	0.130	Median	USEPA 2007a	--	--	--
Fluoranthene	0.500	Median	USEPA 2007a	--	--	--
Fluorene	--	--	--	-5.562	-0.856	USEPA 2007a
Hexachlorobenzene	0.246	Calculated	USEPA 2007a	--	--	--
Hexachlorobutadiene	0.675	Calculated	USEPA 2007a	--	--	--
Indeno(1,2,3-cd)pyrene	0.110	Median	USEPA 2007a	--	--	--
Phenanthrene	--	--	--	-0.167	0.620	USEPA 2007a
Pyrene	0.720	Median	USEPA 2007a	--	--	--
Soil Invertebrates						
Arsenic	--	--	--	-1.421	0.706	Sample et al. 1998a
Cadmium	--	--	--	2.114	0.795	Sample et al. 1998a
Chromium	--	--	--	-0.218	0.807	Sample et al. 1998a
Copper	--	--	--	-0.075	0.733	Sample et al. 1998a
Lead	--	--	--	-0.218	0.807	Sample et al. 1998a
Mercury	1.186	Geometric mean	Sample et al. 1998a	--	--	--
Selenium	--	--	--	-0.075	0.733	Sample et al. 1998a
Silver	2.045	Median	Sample et al. 1998a	--	--	--
Zinc	--	--	--	4.449	0.328	Sample et al. 1998a
Acenaphthylene	0.220	Median	Beyer and Stafford 1993	--	--	--
Anthracene	0.320	Median	Beyer and Stafford 1993	--	--	--
Benzo(a)anthracene	0.270	Median	Beyer and Stafford 1993	--	--	--
Benzo(a)pyrene	0.340	Median	Beyer and Stafford 1993	--	--	--
Benzo(b)fluoranthene	0.210	Median	Beyer and Stafford 1993	--	--	--
Benzo(g,h,i)perylene	0.150	Median	Beyer and Stafford 1993	--	--	--
Benzo(k)fluoranthene	0.210	Median	Beyer and Stafford 1993	--	--	--
Chrysene	0.440	Median	Beyer and Stafford 1993	--	--	--
Dibenz(a,h)anthracene	0.490	Median	Beyer and Stafford 1993	--	--	--
Fluoranthene	0.370	Median	Beyer and Stafford 1993	--	--	--
Fluorene	0.200	Median	Beyer and Stafford 1993	--	--	--
Hexachlorobenzene	1.690	Mean	Beyer 1996	--	--	--
Hexachlorobutadiene	1.000	Assumed	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.410	Median	Beyer and Stafford 1993	--	--	--
Phenanthrene	0.280	Median	Beyer and Stafford 1993	--	--	--
Pyrene	0.390	Median	Beyer and Stafford 1993	--	--	--

TABLE 10

Bioaccumulation Factors for Food Items

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, Jacksonville, North Carolina

	Soil-Biota BAF (dry weight)			Regression		
	Value	*Basis*	*Reference*	*B0*	*B1*	*Reference*
Small Mammal (herbivore-vole)						
Arsenic	--	--	--	-5.653	1.138	Sample et al. 1998b
Cadmium	--	--	--	-1.257	0.472	Sample et al. 1998b
Chromium	--	--	--	-1.460	0.734	Sample et al. 1998b
Copper	--	--	--	2.042	0.144	Sample et al. 1998b
Lead	--	--	--	-0.611	0.518	Sample et al. 1998b
Mercury	0.067	Geometric mean	Sample et al. 1998b	--	--	--
Selenium	--	--	--	-0.416	0.376	Sample et al. 1998b
Silver	0.006	Geometric mean	Sample et al. 1998b	--	--	--
Zinc	--	--	--	4.363	0.071	Sample et al. 1998b
Acenaphthylene	0.000	Assumed	USEPA 2007a	--	--	--
Anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(a)anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(a)pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Chrysene	0.000	Assumed	USEPA 2007a	--	--	--
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Fluorene	0.000	Assumed	USEPA 2007a	--	--	--
Hexachlorobenzene	0.000	Assumed	USEPA 2007a	--	--	--
Hexachlorobutadiene	0.000	Assumed	USEPA 2007a	--	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Phenanthrene	0.000	Assumed	USEPA 2007a	--	--	--
Pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Small Mammal (insectivore-shrew)						
Arsenic	--	--	--	-4.847	0.819	Sample et al. 1998b
Cadmium	--	--	--	0.815	0.964	Sample et al. 1998b
Chromium	--	--	--	-1.460	0.734	Sample et al. 1998b
Copper	--	--	--	2.104	0.178	Sample et al. 1998b
Lead	--	--	--	0.482	0.487	Sample et al. 1998b
Mercury	0.067	Geometric mean	Sample et al. 1998b	--	--	--
Selenium	--	--	--	-0.416	0.376	Sample et al. 1998b
Silver	0.036	Geometric mean	Sample et al. 1998b	--	--	--
Zinc	--	--	--	4.248	0.132	Sample et al. 1998b
Acenaphthylene	0.000	Assumed	USEPA 2007a	--	--	--
Anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(a)anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(a)pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Chrysene	0.000	Assumed	USEPA 2007a	--	--	--
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Fluorene	0.000	Assumed	USEPA 2007a	--	--	--
Hexachlorobenzene	0.000	Assumed	USEPA 2007a	--	--	--
Hexachlorobutadiene	0.000	Assumed	USEPA 2007a	--	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Phenanthrene	0.000	Assumed	USEPA 2007a	--	--	--
Pyrene	0.000	Assumed	USEPA 2007a	--	--	--

TABLE 10

Bioaccumulation Factors for Food Items

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MCB CamLej, Jacksonville, North Carolina

	Soil-Biota BAF (dry weight)			Regression		
	Value	*Basis*	*Reference*	*B0*	*B1*	*Reference*
Small Mammal (omnivore-mouse)						
Arsenic	--	--	--	-4.847	0.819	Sample et al. 1998b
Cadmium	--	--	--	-1.538	0.566	Sample et al. 1998b
Chromium	--	--	--	-1.460	0.734	Sample et al. 1998b
Copper	--	--	--	2.104	0.178	Sample et al. 1998b
Lead	--	--	--	0.076	0.442	Sample et al. 1998b
Mercury	0.067	Geometric mean	Sample et al. 1998b			
Selenium	--	--	--	-0.416	0.376	Sample et al. 1998b
Silver	0.151	Median	Sample et al. 1998b	--	--	--
Zinc	--	--	--	4.248	0.132	Sample et al. 1998b
Acenaphthylene	0.000	Assumed	USEPA 2007a	--	--	--
Anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(a)anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(a)pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007a	--	--	--
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Chrysene	0.000	Assumed	USEPA 2007a	--	--	--
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007a	--	--	--
Fluoranthene	0.000	Assumed	USEPA 2007a	--	--	--
Fluorene	0.000	Assumed	USEPA 2007a	--	--	--
Hexachlorobenzene	0.000	Assumed	USEPA 2007a	--	--	--
Hexachlorobutadiene	0.000	Assumed	USEPA 2007a	--	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Phenanthrene	0.000	Assumed	USEPA 2007a	--	--	--
Pyrene	0.000	Assumed	USEPA 2007a	--	--	--
Sediment Invertebrates						
Arsenic	--	--	--	-0.292	0.754	Bechtel Jacobs 1998b
Cadmium	--	--	--	-0.314	0.513	Bechtel Jacobs 1998b
Chromium	--	--	--	0.209	0.365	Bechtel Jacobs 1998b
Copper	0.824	Geometric mean	Bechtel Jacobs 1998b	--	--	--
Lead	--	--	--	-0.515	0.653	Bechtel Jacobs 1998b
Mercury	1.186	Geometric mean	Bechtel Jacobs 1998b	--	--	--
Selenium	1.000	Assumed	--	--	--	--
Silver	0.180	Mean	Hirsch 1998	--	--	--
Zinc	--	--	--	1.890	0.126	Bechtel Jacobs 1998b
Acenaphthylene	0.899	Median	USEPA 2009c; USACOE 2010	--	--	--
Anthracene	3.999	Median	USACOE 2010	--	--	--
Benzo(a)anthracene	1.135	Median	USACOE 2010	--	--	--
Benzo(a)pyrene	0.430	Median	USACOE 2010	--	--	--
Benzo(b)fluoranthene	0.028	Median	USACOE 2010	--	--	--
Benzo(g,h,i)perylene	0.021	Median	USACOE 2010	--	--	--
Benzo(k)fluoranthene	1.735	Median	USACOE 2010	--	--	--
Chrysene	1.307	Median	USACOE 2010	--	--	--
Dibenz(a,h)anthracene	0.236	Median	USEPA 2009c; USACOE 2010	--	--	--
Fluoranthene	1.094	Median	USACOE 2010	--	--	--
Fluorene	3.673	Median	Maruya et al. 1997	--	--	--
Hexachlorobenzene	0.512	Mean	Oliver and Niimi 1988	--	--	--
Hexachlorobutadiene	0.385	Mean	Oliver and Niimi 1988	--	--	--
Indeno(1,2,3-cd)pyrene	0.022	Median	USACOE 2010	--	--	--
Phenanthrene	3.032	Median	USACOE 2010	--	--	--
Pyrene	3.563	Median	USEPA 2009c; USACOE 2010	--	--	--

TABLE 10

Bioaccumulation Factors for Food Items

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MCB CamLej, Jacksonville, North Carolina

	Soil-Biota BAF (dry weight)			Regression		
	Value	*Basis*	*Reference*	*B0*	*B1*	*Reference*
Fish						
Arsenic	0.126	Mean	Pascoe et al. 1996	--	--	--
Cadmium	0.164	Mean	Pascoe et al. 1996	--	--	--
Chromium	0.038	Mean	Krantzberg and Boyd 1992	--	--	--
Copper	0.100	Mean	Krantzberg and Boyd 1992	--	--	--
Lead	0.070	Mean	Krantzberg and Boyd 1992	--	--	--
Mercury	3.250	Average mean	Cope et al. 1990	--	--	--
Selenium	1.000	assumed	--	--	--	--
Silver	1.000	assumed	--	--	--	--
Zinc	0.147	Mean	Pascoe et al. 1996	--	--	--
Acenaphthylene	0.331	Median	USEPA 2009c; USACOE 2010	--	--	--
Anthracene	0.200	Median	USEPA 2009c; USACOE 2010	--	--	--
Benzo(a)anthracene	0.057	Median	USEPA 2009c; USACOE 2010	--	--	--
Benzo(a)pyrene	0.050	Median	USEPA 2009c; USACOE 2010	--	--	--
Benzo(b)fluoranthene	0.060	Median	USEPA 2009c; USACOE 2010	--	--	--
Benzo(g,h,i)perylene	0.097	Median	USEPA 2009c; USACOE 2010	--	--	--
Benzo(k)fluoranthene	0.058	Median	USEPA 2009c; USACOE 2010	--	--	--
Chrysene	0.064	Median	USEPA 2009c; USACOE 2010	--	--	--
Dibenz(a,h)anthracene	0.052	Median	USEPA 2009c; USACOE 2010	--	--	--
Fluoranthene	0.069	Median	USEPA 2009c; USACOE 2010	--	--	--
Fluorene	0.568	Median	USEPA 2009c; USACOE 2010	--	--	--
Hexachlorobenzene	2.160	Median	USEPA 1997c	--	--	--
Hexachlorobutadiene	0.864	Median	Parkerton et al. 1993	--	--	--
Indeno(1,2,3-cd)pyrene	0.059	Median	USEPA 2009c; USACOE 2010	--	--	--
Phenanthrene	0.199	Median	USEPA 2009c; USACOE 2010	--	--	--
Pyrene	0.082	Median	USEPA 2009c; USACOE 2010	--	--	--

Notes

BAF - bioaccumulation factor

Generated by: Rachel Zajac/RDU

Checked by: Kelly Taylor/DFW

TABLE 11
Toxicity Reference Values for Mammals
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, Jacksonville, North Carolina

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	NOAEL (mg/kg/d)	MATC (mg/kg/d)	LOAEL (mg/kg/d)	Reference
Inorganics										
Arsenic[a]	As+3	mouse	3 generations	Yes	oral in water/diet	reproduction	0.252	0.56	1.26	Sample et al. 1996
Arsenic[b]	--	dog	chronic	--	oral	--	1.04	1.31	1.66	USEPA 2005a
Cadmium	--	rat	chronic	--	oral	--	0.77	2.43	7.70	USEPA 2005b
Chromium	Cr+3	multiple	chronic	--	oral	--	2.40	5.37	12.0	USEPA 2008
Copper[a]	--	pig	chronic	--	oral	--	5.60	7.23	9.34	USEPA 2007b
Copper[b]	Copper sulfate	mink	357 days	Yes	oral in diet	reproduction	11.7	13.3	15.1	Sample et al. 1996
Lead	--	rat	chronic	--	oral	--	4.70	6.47	8.90	USEPA 2005c
Mercury[a]	Methyl mercury chloride	rat	3 generations	Yes	oral in diet	reproduction	0.032	0.072	0.160	Sample et al. 1996
Mercury[b]	Methyl mercury chloride	mink	93 days	No	oral in diet	survival/weight loss/ataxia	0.150	0.192	0.247	Sample et al. 1996
Selenium	Potassium selenate (SeO4)	rat	1 year	Yes	oral in water	reproduction	0.20	0.26	0.33	Sample et al. 1996
Silver	--	pig	chronic	--	oral	--	12.0	26.9	60.2	USEPA 2006b
Zinc	--	multiple	chronic	--	oral	--	75.4	169	377	USEPA 2007c
Semi-volatile Organics										
Acenaphthylene	--	rat	chronic	--	oral	--	65.6	147	328	USEPA 2007d
Anthracene	--	rat	chronic	--	oral	--	65.6	147	328	USEPA 2007d
Benzo(a)anthracene	--	mouse	chronic	--	oral	--	0.615	1.37	3.07	USEPA 2007d
Benzo(a)pyrene	--	mouse	chronic	--	oral	--	0.615	1	3.07	USEPA 2007d
Benzo(b)fluoranthene	--	mouse	chronic	--	oral	--	0.615	1	3.07	USEPA 2007d
Benzo(g,h,i)perylene	--	mouse	chronic	--	oral	--	0.615	1	3.07	USEPA 2007d
Benzo(k)fluoranthene	--	mouse	chronic	--	oral	--	0.615	1.37	3.07	USEPA 2007d
Chrysene	--	mouse	chronic	--	oral	--	0.615	1.37	3.07	USEPA 2007d
Dibenz(a,h)anthracene	--	mouse	chronic	--	oral	--	0.615	1.37	3.07	USEPA 2007d
Fluoranthene	--	rat	chronic	--	oral	--	65.6	147	328	USEPA 2007d
Fluorene	--	rat	chronic	--	oral	--	65.6	147	328	USEPA 2007d
Hexachlorobenzene	--	rat	4 generations	Yes	oral in diet	reproduction	2.00	2.83	4.00	ATSDR 2002
Hexachlorobutadiene	--	rat	GD 1-22; LD 1-21	Yes	oral in diet	developmental	2.00	6.32	20.0	ATSDR 1994
Indeno(1,2,3-cd)pyrene	--	mouse	chronic	--	oral	--	0.615	1.37	3.07	USEPA 2007d
Phenanthrene	--	rat	chronic	--	oral	--	65.6	147	328	USEPA 2007d
Pyrene	--	mouse	chronic	--	oral	--	0.615	1.37	3.07	USEPA 2007d

Notes:
[a] Used for white-footed mouse only
[b] Used for red fox and raccoon only
Generated by: Sara Kent/ATL
Checked by: Jon Weier/ATL

TABLE 12
Toxicity Reference Values for Birds
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, Jacksonville, North Carolina

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	NOAEL (mg/kg/d)	MATC (mg/kg/d)	LOAEL (mg/kg/d)	Reference
Inorganics										
Arsenic[a]	Copper acetoarsenite	brown-headed cowbird	7 months	No	oral in diet	survival	2.46	4.26	7.38	Sample et al. 1996
Arsenic[b]	Sodium arsenite	mallard	128 days	No	oral in diet	survival	5.14	8.12	12.8	Sample et al. 1996
Arsenic[c]	0	chicken	0	0	0	0	2.2	5	11	USEPA 2005a
Cadmium	--	multiple	chronic	--	oral	--	1.47	3.29	7.35	USEPA 2005b
Chromium	Cr+3	multiple	chronic	--	oral	--	2.66	5.95	13.3	USEPA 2008
Copper	--	chicken	chronic	--	oral	--	4.05	7.00	12.1	USEPA 2007b
Lead[d]	Metallic	American kestrel	7 months	Yes	oral in diet	reproduction	3.85	8.61	19.3	Sample et al. 1996
Lead[c]	--	chicken	chronic	--	oral	--	1.63	2.31	3.26	USEPA 2005c
Mercury[e]	--	red-tailed hawk	12 weeks	Yes	oral in diet	survival/neurological	0.49	0.77	1.20	USEPA 1995
Mercury[c]	Mercuric chloride	Japanese quail	1 year	Yes	oral in diet	reproduction	0.45	0.64	0.90	Sample et al. 1996
Mercury[f]	Methyl mercury	mallard	3 generations	Yes	oral in diet	reproduction	0.026	0.045	0.078	USEPA 1997b
Selenium[b]	Selanomethionine	black-crowned night-heron	94 days	Yes	oral in diet	reproduction	1.80	4.02	9.00	Sample et al. 1996
Selenium[g]	Selanomethionine	mallard	100 days	Yes	oral in diet	reproduction	0.40	0.57	0.80	Sample et al. 1996
Selenium[e]	Selanomethionine	screech owl	13.7 weeks	Yes	oral in diet	reproduction	0.44	0.81	1.50	Sample et al. 1996
Selenium[c]	--	chicken	chronic	--	oral	--	0.29	0.41	0.58	USEPA 2007e
Silver	--	turkey	chronic	--	oral	--	4.04	9.03	20.2	USEPA 2006b
Zinc	--	multiple	chronic	--	oral	--	66.1	148	331	USEPA 2007c
Semi-volatile Organics										
Acenaphthylene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Anthracene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Benzo(a)anthracene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Benzo(a)pyrene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Rigdon and Neal 1963
Benzo(b)fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Benzo(g,h,i)perylene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Benzo(k)fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Chrysene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Dibenz(a,h)anthracene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Fluorene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Hexachlorobenzene	--	Japanese quail	90 days	Yes	oral in diet	reproduction	0.11	0.25	0.57	Coulston and Kolbye 1994; TERRETOX 2002
Hexachlorobutadiene	--	Japanese quail	90 days	Yes	oral in diet	reproduction	3.39	7.58	17.0	Coulston and Kolbye 1994; TERRETOX 2002
Indeno(1,2,3-cd)pyrene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Phenanthrene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value
Pyrene	--	chicken	35 days	No	oral in diet	reproduction	7.10	15.9	35.5	Benzo(a)pyrene value

Notes:
[a] Used for American robin and marsh wren only
[b] Used for belted kingfisher only
[c] Used for mourning dove only
[d] Used for American robin, belted kingfisher, and marsh wren only
[e] Used for American robin only
[f] Used for belted kingfisher and marsh wren only
[g] Used for marsh wren only
Generated by: Sara Kent/ATL
Checked by: Jon Weier/ATL

TABLE 13

Food Chain Transfer Screening Hazard Quotients Using Maximums - Step 3

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Chemical	Hazard Quotients													
	Raccoon		Red fox		White-footed mouse		American robin		Belted kingfisher		Marsh wren		Mourning dove	
	NOAEL	*LOAEL*	*NOAEL*	*LOAEL*	*NOAEL*	*LOAEL*	*NOAEL*	*LOAEL*	*NOAEL*	*LOAEL*	*NOAEL*	*LOAEL*	*NOAEL*	*LOAEL*
Inorganics														
Arsenic	6.38E-01	4.00E-01	NA	NA	NA	NA	NA	NA	6.94E-01	2.78E-01	3.66E+00	1.22E+00	NA	NA
Cadmium	2.46E-02	2.46E-03	3.70E-01	3.70E-02	8.79E-01	8.79E-02	1.29E+00	2.58E-01	4.26E-02	8.52E-03	1.38E-01	2.76E-02	2.63E-01	5.26E-02
Chromium	5.87E-02	1.17E-02	1.72E-01	3.45E-02	2.81E-01	5.62E-02	8.16E-01	1.63E-01	NA	NA	NA	NA	6.83E-01	1.37E-01
Copper	1.02E-01	7.88E-02	6.00E-02	4.64E-02	1.00E-01	6.02E-02	4.57E-01	1.53E-01	8.87E-01	2.97E-01	6.19E+00	2.07E+00	8.17E-01	2.73E-01
Lead	3.38E-02	1.79E-02	2.14E-01	1.13E-01	3.25E-01	1.72E-01	1.32E+00	2.65E-01	1.38E-01	2.75E-02	4.23E-01	8.46E-02	2.50E+00	1.25E+00
Mercury	2.81E-02	1.71E-02	2.34E-01	1.42E-01	4.47E+00	8.93E-01	8.49E-01	3.47E-01	2.93E+00	9.76E-01	2.14E+00	7.13E-01	5.05E-01	2.52E-01
Selenium	1.26E+00	7.63E-01	2.35E-01	1.42E-01	3.92E-01	2.38E-01	5.29E-01	1.55E-01	1.12E+00	2.25E-01	9.18E+00	4.59E+00	1.57E+00	7.86E-01
Silver	1.54E-04	3.09E-05	3.87E-02	7.75E-03	2.13E-01	4.25E-02	1.80E+00	3.60E-01	1.13E-02	2.26E-03	5.22E-03	1.04E-03	2.35E-01	4.70E-02
Zinc	3.21E-02	6.42E-03	7.74E-02	1.55E-02	1.61E-01	3.21E-02	5.35E-01	1.07E-01	1.05E-01	2.10E-02	5.41E-01	1.08E-01	5.11E-01	1.02E-01
Semivolatile Organics														
Acenaphthylene	1.44E-04	2.88E-05	2.51E-06	5.02E-07	1.10E-05	2.21E-06	3.21E-04	6.42E-05	NA	NA	NA	NA	8.36E-04	1.67E-04
Anthracene	4.51E-04	9.02E-05	8.68E-05	1.74E-05	3.81E-04	7.63E-05	1.11E-02	2.21E-03	NA	NA	NA	NA	2.07E-02	4.15E-03
Benzo(a)anthracene	1.43E-03	2.87E-04	4.54E-02	9.09E-03	1.52E-01	3.05E-02	4.35E-02	8.70E-03	2.99E-04	5.98E-05	2.67E-03	5.34E-04	3.28E-02	6.57E-03
Benzo(a)pyrene	5.94E-04	1.19E-04	5.86E-02	1.17E-02	2.43E-01	4.87E-02	6.67E-02	1.33E-02	NA	NA	NA	NA	8.21E-02	1.64E-02
Benzo(b)fluoranthene	9.93E-04	1.99E-04	8.77E-02	1.76E-02	3.46E-01	6.92E-02	9.61E-02	1.92E-02	1.42E-04	2.84E-05	3.59E-04	7.19E-05	2.16E-01	4.31E-02
Benzo(g,h,i)perylene	2.29E-04	4.58E-05	7.44E-02	1.49E-02	3.22E-01	6.46E-02	8.83E-02	1.77E-02	NA	NA	NA	NA	2.57E-01	5.14E-02
Benzo(k)fluoranthene	1.72E-03	3.44E-04	5.00E-02	1.00E-02	1.58E-01	3.17E-02	4.59E-02	9.17E-03	NA	NA	NA	NA	6.08E-02	1.22E-02
Chrysene	1.67E-02	3.35E-03	7.75E-02	1.55E-02	3.48E-01	6.97E-02	9.38E-02	1.88E-02	NA	NA	NA	NA	4.79E-02	9.59E-03
Dibenz(a,h)anthracene	1.85E-04	3.71E-05	2.35E-02	4.72E-03	1.16E-01	2.33E-02	3.09E-02	6.18E-03	NA	NA	NA	NA	3.19E-02	6.38E-03
Fluoranthene	4.31E-05	8.62E-06	2.71E-03	5.42E-04	1.31E-02	2.63E-03	3.76E-01	7.51E-02	8.41E-04	1.68E-04	7.12E-03	1.42E-03	8.22E-01	1.64E-01
Fluorene	2.27E-05	4.54E-06	NA	NA	NA	NA	NA	NA	6.03E-04	1.21E-04	3.64E-03	7.27E-04	NA	NA
Hexachlorobenzene	4.53E-05	2.26E-05	1.91E-04	9.53E-05	1.58E-04	7.89E-05	8.05E-03	1.61E-03	1.88E-02	3.76E-03	9.65E-03	1.93E-03	4.89E-03	9.77E-04
Hexachlorobutadiene	1.34E-04	1.34E-05	1.77E-04	1.77E-05	1.40E-04	1.40E-05	2.45E-04	4.91E-05	NA	NA	NA	NA	3.97E-04	7.93E-05
Indeno(1,2,3-cd)pyrene	1.37E-04	2.74E-05	4.42E-02	8.85E-03	1.99E-01	3.99E-02	5.38E-02	1.08E-02	NA	NA	NA	NA	5.74E-02	1.15E-02
Phenanthrene	1.93E-04	3.86E-05	8.28E-04	1.66E-04	3.37E-03	6.75E-04	9.92E-02	1.98E-02	4.25E-03	8.51E-04	3.47E-02	6.93E-03	1.77E-01	3.54E-02
Pyrene	7.67E-03	1.54E-03	2.29E-01	4.59E-02	1.16E+00	2.32E-01	3.08E-01	6.17E-02	NA	NA	NA	NA	7.47E-01	1.49E-01

Notes

Hazard quotients in **bold** and shaded gray exceed one.

NA - Not applicable

NOAEL - no observed adverse effect level

LOAEL - lowest observed adverse effect level

TABLE 14

Food Chain Transfer Screening Hazard Quotients Using Means - Step 3

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, North Carolina

Chemical	Hazard Quotients			
	Marsh wren		Mourning dove	
	NOAEL	*LOAEL*	*NOAEL*	*LOAEL*
Inorganics				
Arsenic	1.81E+00	6.04E-01	NA	NA
Copper	2.83E+00	9.46E-01	1.55E-01	5.18E-02
Lead	2.52E-01	5.03E-02	3.98E-01	1.99E-01
Selenium	4.39E+00	2.20E+00	1.16E-01	5.79E-02

Notes

Hazard quotients in **bold** and shaded gray exceed one.

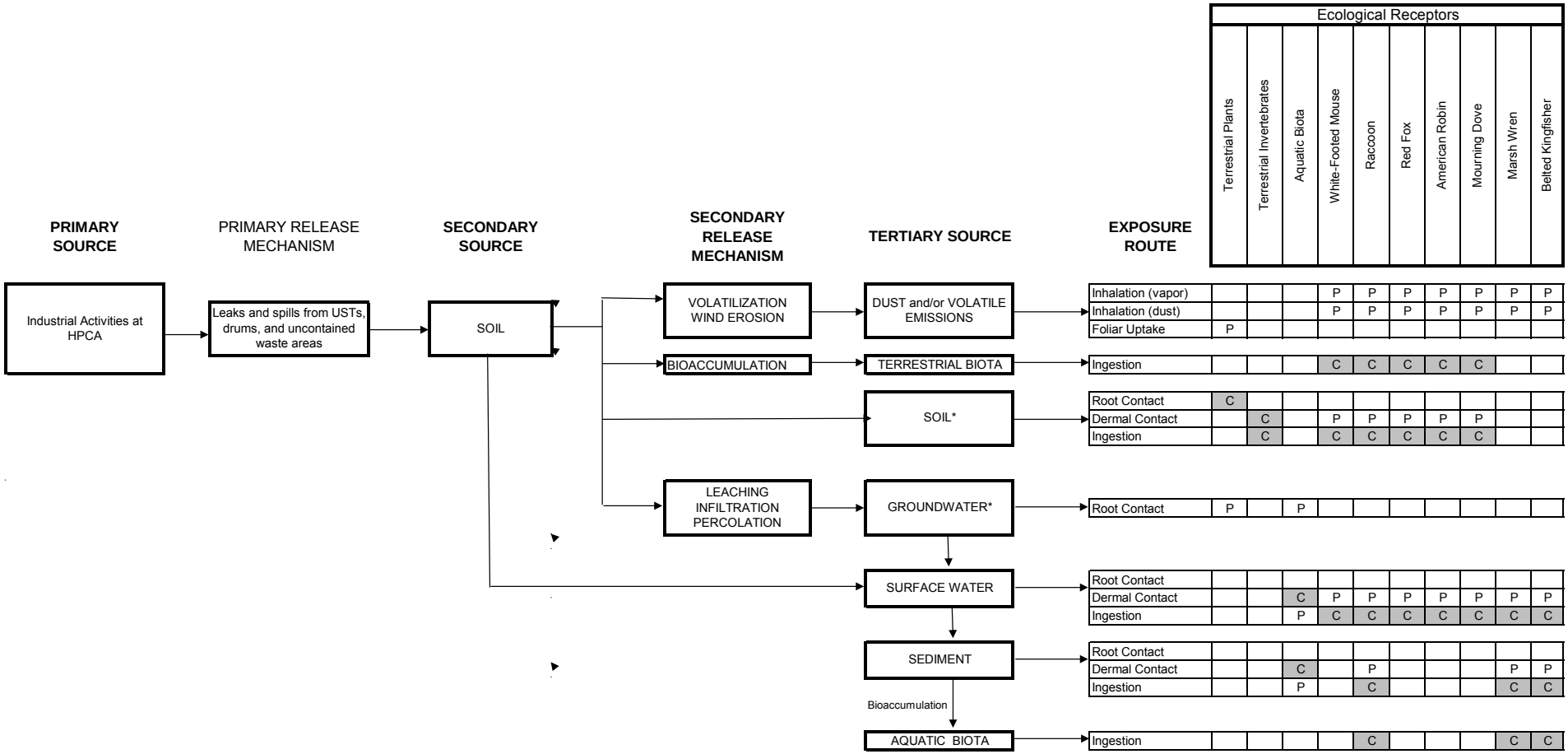
NA - Not applicable

NOAEL - no observed adverse effect level

LOAEL - lowest observed adverse effect level

TABLE 15
Drainage Survey Results
HPCA Ecological Risk Assessment - Technical Memorandum
MCB CamLej, North Carolina

Survey Categories	Survey Locations Feet Upgradient from Louis Road										
	900	**800**	**700**	**600**	**500**	**400**	**300**	**200**	**100**	**50**	**0**
Culverts	Metal, 36", west bank	none	50' east of location	none	none	none	none	none	none	east side, 24", metal	east bank, 24", metal
Width Top of bank to bank (feet)	15	10	15	30	20	12	30	20	25	20	15
North Bank Topography	vertical	vertical, undercut	vertical	gentle slope	steep	steep	steep slope	gentle slope	gentle slope	gentle slope	gentle slope
South Bank Topography	vertical	vertical, undercut	vertical	vertical	steep	vertical, undercut	vertical	steep slope	vertical	steep	steep
Bank Vegetation	grasses, shrubs	deciduous trees	deciduous trees	deciduous trees	small deciduous trees	small deciduous trees	small deciduous trees	small deciduous trees	small trees, holly bush	small trees	flowering plants, grasses
Evidence of Burrowing in Banks?	no	yes	no	no	no	no	yes	no	no	no	no
Trash?	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes
Bird Nests?	no	no	no	no	no	no	no	no	no	no	no
Vertical Depth, Top of North Bank to Bottom of Bed (feet)	8	9	6	7	5	5	8	3	3	3	4
Vertical Depth, Top of South Bank to Bottom of Bed (feet)	8	8	6	6	5	4	7	3	3.5	4	7
Dredged Material on Bank?	no	yes, north bank	yes, north bank	no	yes, north bank	yes, north bank	no	yes, north bank	yes, north bank	no	no
Bed Width	3	3	8	7	10	8	10	8	15	10	12
Bed Vegetation	organic matter	silt, organic matter	organic matter	oragnic matter	organic matter	organic matter	organic matter	organic matter	organic matter	organic matter	organic matter, thin trees
Water Depth (inches)	4	2	7	0.5	6	6	15	7	6	1	4
Flowing or Stagnant?	stagnant	stagnant	stagnant	stagnant	stagnant	stagnant	stagnant	stagnant	stagnant	low flow	stagnant
Water Color	red/orange	clear	clear	clear	red/orange	red/orange	red/orange	red/orange	red/orange	red/orange	red/orange
Water Clarity	very turbid	clear	clear	slightly turbid	clear	clear	clear	clear	slightly turbid	clear	clear
Biota Observed	frog	none	none	racoon prints	none	none	none	none	none	racoon prints	bees in flowers
Sediment Depth (inches)	3	1	11	1	15	13	29	27	8	34	16
Sediment Type	silty sand, black, coarse, loose	silty sand, tan, coarse, loose	silty clay, light brown, loose, organic smell	silty sand, medium brown, very fine, medium dense	silt with some sand, black, very loose	silty clay, dark brown, loose	silty clay, dark brown, loose	silty clay, dark brown, loose	slity clay, dark brown, very loose	slity clay, dark brown, loose	silty clay, dark brown, loose



C - Pathway considered complete for purposes of ecological risk assessment

P - Pathway considered potentially complete, but insignificant

Pathways evaluated quantitatively in ecological risk assessment

* Groundwater and subsurface soil were found to pose no risk based on the ERS as presented in the PA/SI (CH2M HILL, 2010)

FIGURE 1

Conceptual Site Model of Ecological Exposures at HPCA

HPCA Ecological Risk Assessment - Technical Memorandum

MCB CamLej, Jacksonville, North Carolina