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TECHNICAL MEMORANDUM

Stabilization of Hazardous Material, Site 5 Removal Action, St. Juliens Creek Annex, Chesapeake, Virginia

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Data obtained from the waste characterization sampling at St. Juliens Creek Annex (SJCA) Site 5 indicate that material from four of the sample grids from the removal action areas are classified as hazardous; three grids from the Phase 1 area and one grid from the Phase 3 area. The Toxicity Characteristic Leaching Procedure (TCLP) analysis of composite samples from sample grids A, J, L, and R indicate that the areas have leachable lead concentrations of 5,030 mg/L, 19,200 mg/L, 5,490 mg/L, and 9,140 mg/L, respectively (Figure 1). Due to these elevated concentrations, soil excavated from these areas can not be sent to a Subtitle D landfill for disposal without being treated beforehand.

Soil stabilization is the most suitable method for reducing the leaching potential of the lead in the Site 5 soil so it can be disposed as nonhazardous waste. Stabilization is a widely used treatment for the management and disposal of a broad range of contaminated materials and is capable of immobilizing the lead.

The following factors were considered in developing the methodology for stabilization of the hazardous material:

- Because there is a risk of encountering munitions and explosives of concern (MEC) at the site, it is not safe to mix the materials in situ without first screening the soil for MEC. Therefore, stabilization should be conducted ex situ.
- Ex situ stabilization should be conducted within the grid where the material comes from (e.g., excavated materials from grid J will be stabilized within the footprint of grid J).
- The ex situ stabilization area must be protected by appropriate erosion and sediment control measures.
- Stabilized material must be removed from the site within 90 days of excavation.

Several alternatives were considered in the selection of the stabilizing agent for Site 5: Apatite™, EcoBond®, EnviroBlend®, Portland cement. A table presenting a summary of the assessment and comparing the alternatives is provided below:

Comparison of Alternatives			
Option/Material Type	**Anticipated Dosing Rate*** by Weight	**Amount of Amendment Anticipated**† tons	**Relative Cost**
Apatite™	3%	265	Moderate to High
ECOBOND®	2%	180	Moderate
EnviroBlend® 80/20	1-2%	90 - 180	Low to Moderate
EnviroBlend® 90/10	4%	355	Moderate
Portland Cement	3-5%	265 - 440	Low
Hazardous Waste Disposal	NA	NA	High

* The dosing rates provided are rough estimates by the various vendors. Although the dosing rates provided are conservative, the vendors recommend/request treatability testing to be completely sure the dosing rates are accurate.

†For estimating purposes, the unit weight of the soil is assumed to be 1.6 tons per cubic yard (yd^3). The volume of material (soil plus debris) in sample grids A, J, L, and R are 2,100 yd^3, 1,320 yd^3, 900 yd^3, and 1,170 yd^3, respectively. The amount specified provides the total amount of amendment for all of the grids combined.

Based on the stabilizing agents evaluated, the use of Portland cement appears to be the most suitable alternative for stabilizing the lead in the soil at Site 5. Although the use of Portland cement may result in the need for additional measures for dust management, it is still likely to be the most cost-effective option of those presented and is therefore proposed.

As indicated above, treatability study testing is recommended by the vendors to determine the most appropriate stabilization dose. However, due to the relatively small quantity of material requiring stabilization and to reduce schedule delays, JV II proposes application of a conservative dose without treatability study testing; the soil will be amended with a rate of 5 percent Portland cement by weight. The application rate is considered to be conservative, and will not change by grid in an effort to ensure that one application of the stabilization amendment is necessary, regardless of the pre-excavation waste characterization sample results. The application may be in excess for the grids with the relatively lower lead concentrations to meet the non-hazardous classification; however the rate is believed to be sufficient to stabilize the soil with the highest lead concentration. The amount of Portland cement used per grid is provided in the table below. Post-stabilization testing is required by the disposal facility to confirm the success of the stabilization.

Stabilization Summary – Portland Cement Application		
Grid Cell	**Estimated Amount of Soil Excavated*** tons	**Amount of Amendment Anticipated** tons
A	3,360	168
J	2,115	106
L	1,440	72
R	1,875	94
* For estimating purposes, the unit weight of the soil is assumed to be 1.6 tons per cubic yard.		

Stabilization will consist of the following steps:

- The material from the grids with elevated lead concentrations will be excavated
- The material from grids A, J, and L will be mechanically screened in it's respective grid; mechanical screening is not required for grid R because no debris is expected to be found
- The material will be staged, stabilized, and stockpiled within the boundary of that grid. The stockpiles will be surrounded with silt fence, in addition to the erosion and sediment controls specified in the erosion and sediment control plan. Stabilization will consist of mixing the Portland cement in to the soil as it passes through the mechanical screen.
- An additional waste characterization sample for TCLP lead will be collected from the stabilized soil to verify the material is non-hazardous for disposal
- If the sample results indicate the lead concentration is still at a hazardous level, additional Portland cement will be added until sample results indicate it is at a non-hazardous level.
- Upon receipt of the sample results with non-hazardous lead concentrations, the stabilized soil will be moved to the material staging area using an off-road articulating dump. The material will be loaded into haul trucks for disposal.

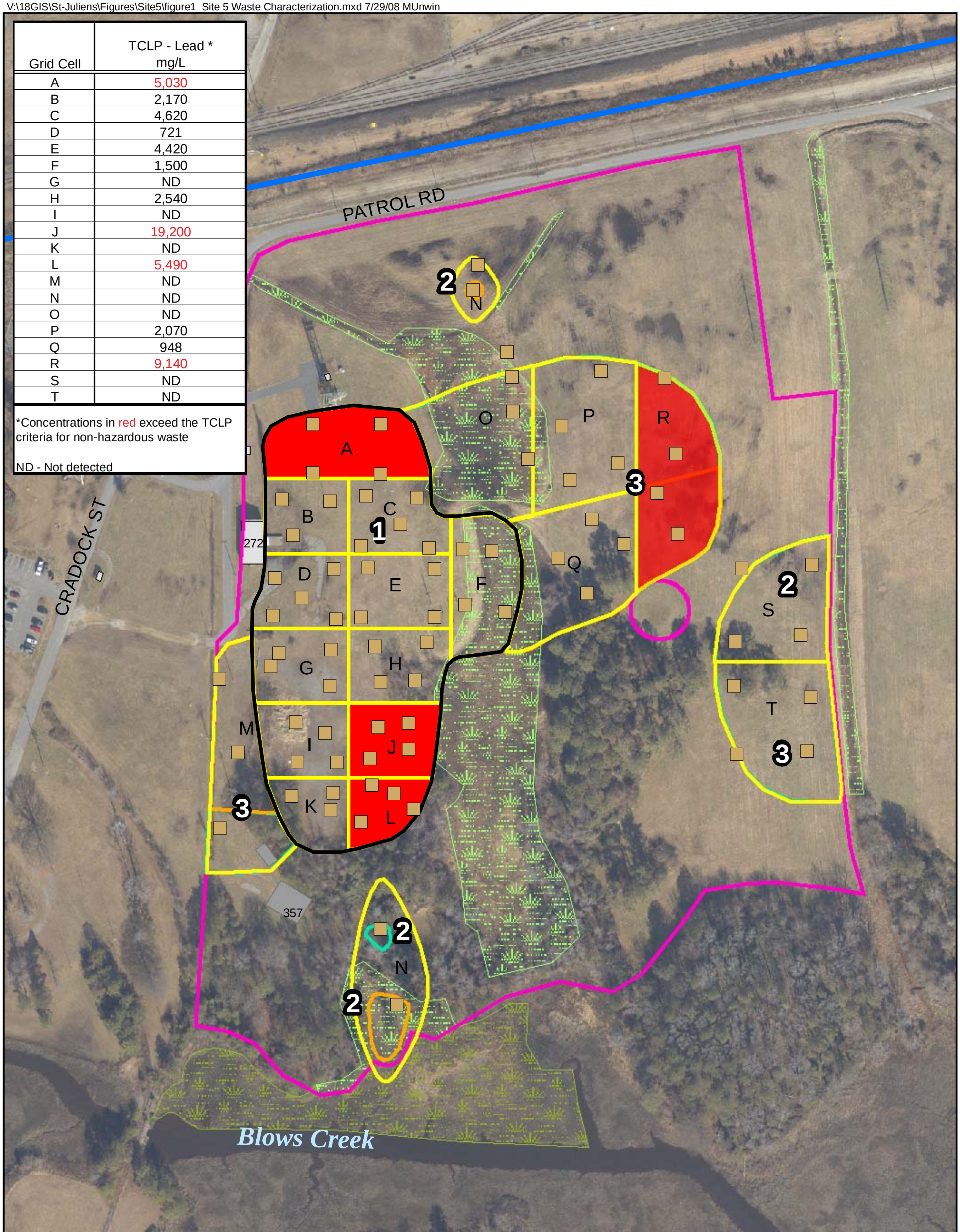
The grids with the hazardous lead concentrations will be generally addressed as they are reached during the overall site excavation sequence; the waste/burnt soil area will be addressed first and the surrounding Phase 3 areas will be addressed second. Since the material excavated from the waste/burnt soil area will be screened, this area will be excavated first to make the work flow with the screening plant more efficient. The excavation is expected to generally move from north to south in order to follow how runoff will move across the site. By conducting the excavation in this manner, the potential for cross contamination will be lessened because runoff entering the active excavation will be from areas that have been addressed.

V:\18GIS\St-Juliens\Figures\Site5\figure1_Site 5 Waste Characterization.mxd 7/29/08 MUnwin

Grid Cell	TCLP - Lead * mg/L
A	5,030
B	2,170
C	4,620
D	721
E	4,420
F	1,500
G	ND
H	2,540
I	ND
J	19,200
K	ND
L	5,490
M	ND
N	ND
O	ND
P	2,070
Q	948
R	9,140
S	ND
T	ND

*Concentrations in red exceed the TCLP criteria for non-hazardous waste

ND - Not detected



LEGEND

- SJCA Boundary
- Site 5 Boundary
- Site 5 Waste/Burnt Soil Area
- Existing Delineated Wetland Area
- Existing Building
- Former Building
- 1 Numbers represent removal action phase.
- Sample Grid
- Human Health Risk-Based Removal Areas
- Ecological Risk-Based Removal Areas
- Pre-excavation Sampling Locations
- Lead concentration TCLP exceeds non-hazardous waste criteria

0 100 200 Feet

N

Figure 1
Site 5 Waste Characterization Results
St. Juliens Creek Annex
Chesapeake, Virginia

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