

November 4, 2010

Mr. Dennis Wilson, Response Manager
Environmental Restoration, LLC
1666 Fabick Drive
St. Louis, MO 63026
dennis.wilson@erllc.com

RE: Site Visit and Recommendations
Smokey Mountain Smelters
Knoxville, Tennessee
Terracon Project: E2105082

Dear Mr. Wilson:

In accordance with our proposal dated November 1, 2010, I performed a site visit to observe the above-referenced facility to develop recommendations for management of site stormwater and leachate seeps. The site visit was performed on November 2, 2010. Present during the site visit, in addition to you, were Mr. Russell Kestle, Jr., P.G. of the U.S. EPA and Mr. Burl Maupin of TDEC. The site visit included a site walkover around the approximate 29 acre site. An aerial image dated 2008 was obtained from the Knox County GIS (KGIS) and is provided as Figure 1.

At the time of the site visit, the waste pile area had been cleared and waste moving operations were occurring to relocate waste to staging areas on the site. The primary concerns at the site are 1) management of leachate seeps where contact liquid is seeping from the waste mass, and 2) stormwater management to prevent run-on water from contacting waste and management of site stormwater to minimize off-site contamination. Each of these issues, as observed, and recommendations for managing them are provided below.

Leachate Seeps Management

Two types of leachate seeps were observed. A primary seep exists at the toe of the waste pile along the southern edge of the waste pile. This seep appears to be the lowest elevation of the waste pile and was likely the lowest natural elevation of the waste area prior to waste placement. This primary seep could be spring fed from higher elevations or could be where the natural native clay soils have created a bottom barrier to infiltration causing the preferential flow path of leachate to be along the surface of the old natural ground surface until discharge at the ground surface at the lowest elevation. Several water impoundments are located upgradient of this seep location. No surface discharge outlet was observed for these impoundments. Thus, the primary outlet of the impounded water would be seepage into soils and/or the waste mass and discharge at this spring/seep location. Stormwater infiltration into the waste pile would also be a source for leachate discharge at this location. Improving the drainage features at the site and permanently draining these impoundments in addition to grading the waste pile



for positive drainage and placing an infiltration barrier over the waste would likely significantly reduce the amount of leachate seepage from this location.

Secondary seeps were observed at several locations along the edges of the waste pile. These seeps appeared to be a milky white discharge of small quantity. Reducing the infiltration of rain water into the waste pile may significantly reduce the presence of these seeps. Figure 1 illustrates the observed location of these seeps.

Stormwater Management

To minimize infiltration into the waste mass, the waste mass and cap should be graded to prevent stormwater ponding and to promote drainage away from the waste pile. The waste mass should be graded with minimum slopes of 5 percent (10 percent would be more preferable) and maximum slopes of 4 (horizontal): 1 (vertical). These minimum slopes will promote drainage off of the waste pile and the maximum slopes will promote drainage but allow for adequate slope maintenance. These slopes are conceptually illustrated on Figure 2.

With the waste pile capped and graded to promote drainage away from the waste mass, the stormwater will need to be conveyed away from the waste pile to the final point of discharge from the site. Ditches or drainage swales should be developed around the perimeter of the site to direct drainage to the low side of the site. Currently, there are several areas on the east side of the site that impound water permanently and do not drain. Some off-site drainage enters this area from a culvert under the railroad. Ditches should be graded to connect these areas and drain them. These ditches should be constructed as wide as possible (i.e. swales) to promote shallow flow to minimize erosion. The ditches should be grassed, at a minimum, and may require permanent erosion control matting and/or armored protection such as rip-rap or crushed concrete. Ditch sizing and protection design can be performed but will require a site topographic survey and hydrology study and is beyond the scope of this phase of work. Figure 3 conceptually illustrates the location of these ditches and the conveyance of stormwater off-site.

Other Recommendations and Considerations

The placement of an interim cap is crucial to minimizing seepage of water into the waste mass. If possible, this cap should be constructed of clayey soils to create a low permeability barrier. Further, the surface of the existing waste mass should be compacted to densify the waste and lower the permeability. The final cover should include a layer of topsoil suitable to sustain a healthy vegetative cover. We recommend consulting with the Knox County Farm Service Agency to test the final cover to determine fertilizing requirements and for selection of a hearty grass species. A healthy stand of vegetative cover is crucial to the performance of the interim cap.

As we discussed during the site visit, the site clearing for drainage improvements will generate substantial organic debris, in addition to the existing pile of wood debris. Instead of burning or hauling this wood debris off, this debris could be chipped and wind-rowed near the toe of the waste mass to create a bio-filter to slow stormwater and remove sediments.

Closing

The goal of minimizing off-site migration of contaminants from this site can largely be achieved by minimizing the infiltration of water into the waste mass. This should be done through the placement of an infiltration layer, or cap, over the waste mass, maximizing surface water runoff away from the waste mass, and minimizing surface water run on onto or into the waste mass.

The recommendations contained herein are general in nature and should not be considered to be all requirements necessary to bring the site into compliance with regulatory or other applicable laws or statutes. The determination of permitting, detention, and sediment pond needs and the development of complete or formal BMP's or an Erosion and Sediment Control Plan were not within the scope of work of our services. We appreciate the opportunity to be of service to Environmental Restoration, LLC on this project. If you have any questions about the recommendations or observations contained in this letter, please contact us.

Sincerely,

Terracon Consultants, Inc.

Jeffrey J. Breedlove, P.E.
Senior Principal
jjbreedlove@terracon.com

Reviewed by: DEW

Attachments



IMAGE SOURCE: KGIS ©2010

Project Manager:	JJB
Drawn By:	JJB
Checked By:	JJB
Approved By:	JJB
Project No.	E2105082
Scale:	N/A
File Name:	
Date:	11/4/10

Terracon
Consulting Engineers & Scientists

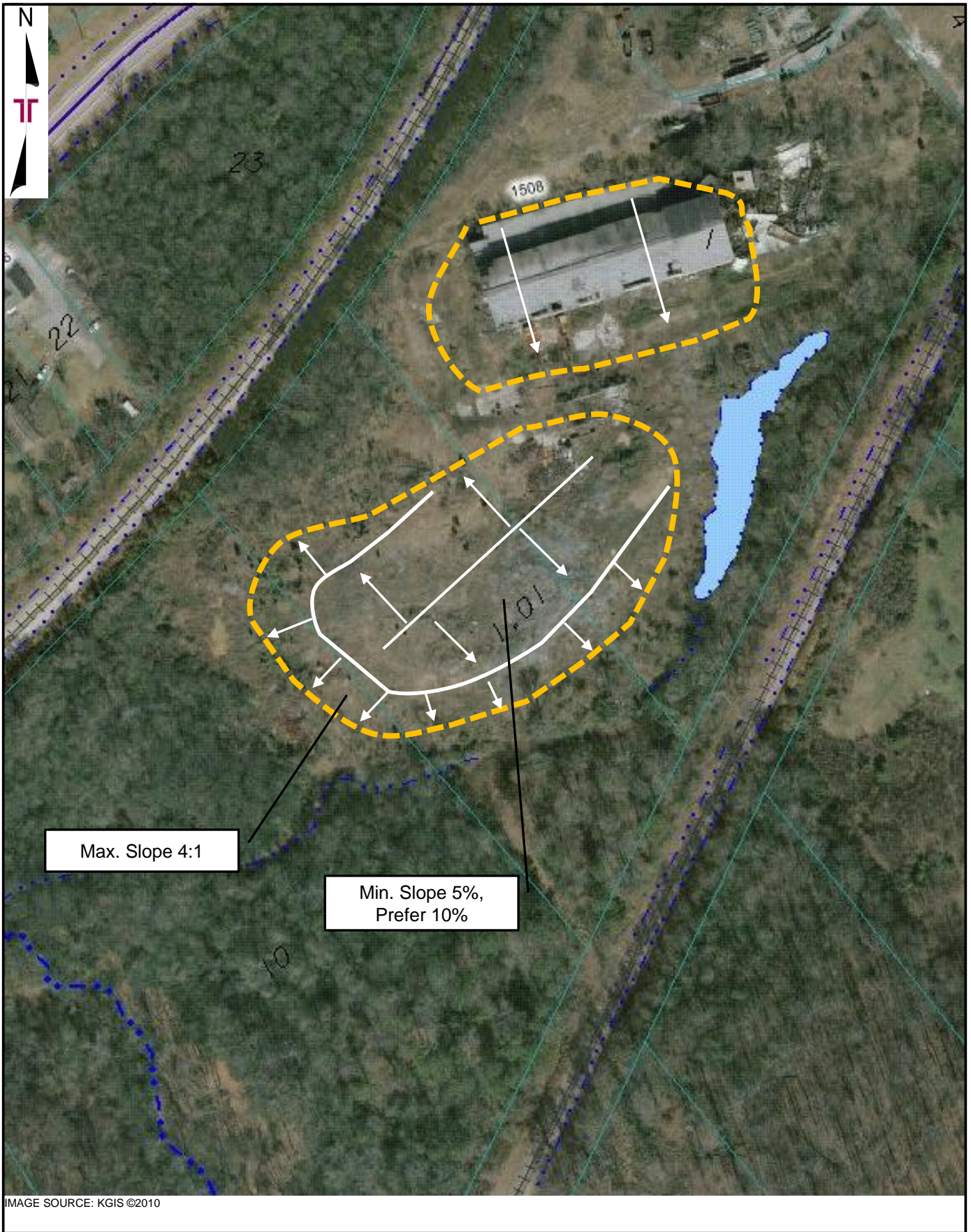
3601 Mojave Court, Suite A Columbia, Missouri 65202
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SITE AERIAL IMAGE

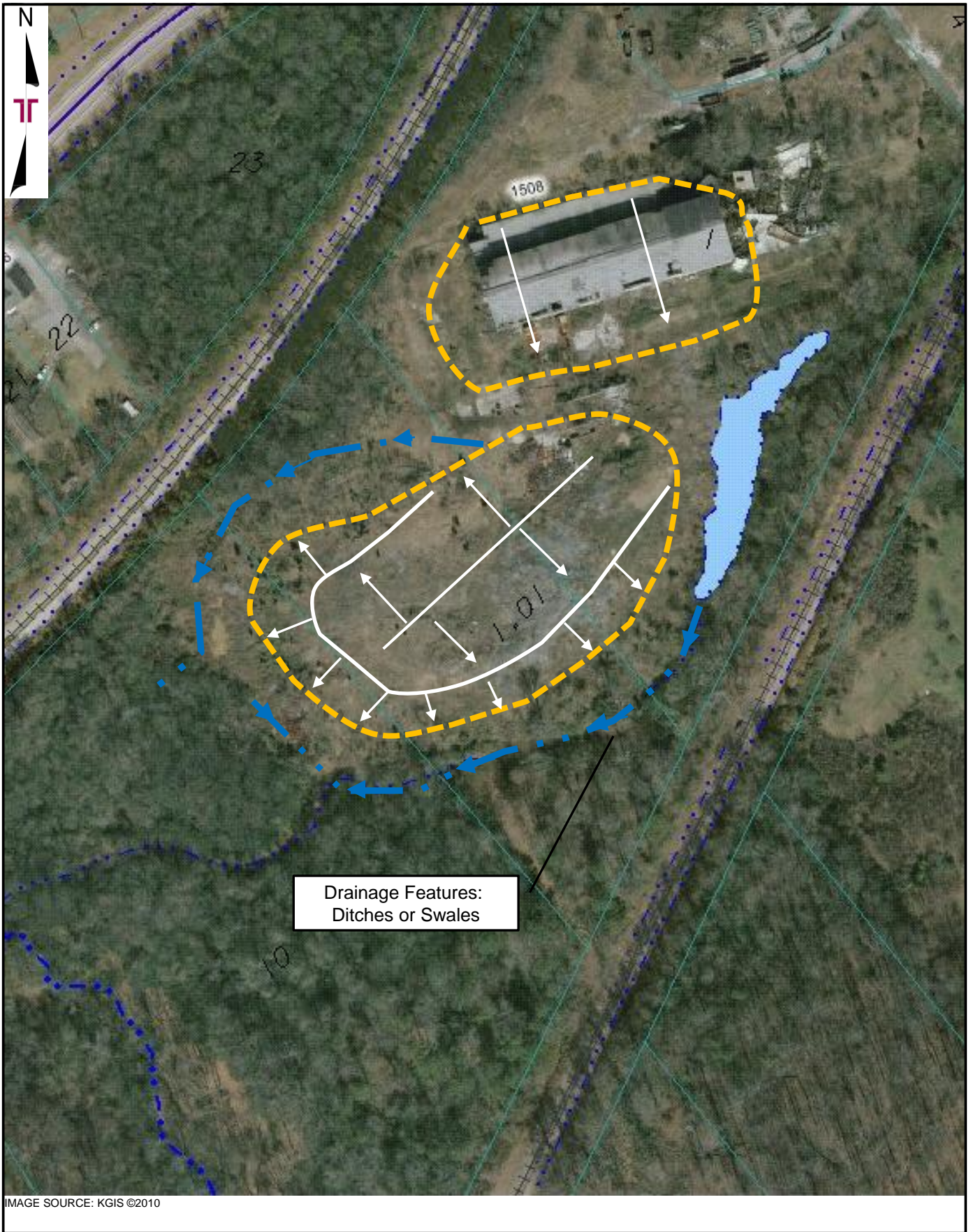
SMOKEY MOUNTAIN SMELTERS
1508 MARYVILLE PIKE
KNOXVILLE, TN


FIG No.

1



Project Manager: JJB	Project No. E2105082	 <p>3601 Mojave Court, Suite A Columbia, Missouri 65202 PH. (573) 214-2677 FAX. (573) 214-2714</p>	RECOMMENED INT. COVER GRADES SMOKEY MOUNTAIN SMELTERS 1508 MARYVILLE PIKE KNOXVILLE, TN	FIG No. 2
Drawn By: JJB	Scale: N/A			
Checked By:	File Name:			
Approved By: JJB	Date: 11/4/10			



Project Manager: JJB	Project No. E2105082	 <p>3601 Mojave Court, Suite A Columbia, Missouri 65202 PH. (573) 214-2677 FAX. (573) 214-2714</p>	RECOMMENED DRAINAGE IMPROVEMENTS	FIG No.
Drawn By: JJB	Scale: N/A		SMOKEY MOUNTAIN SMELTERS 1508 MARYVILLE PIKE KNOXVILLE, TN	3
Checked By:	File Name:			
Approved By: JJB	Date: 11/4/10			