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SUPPLEMENT TO
REMEDIAL ACTION DESIGN REPORT

BER SCANNED
JUL 16 2013

For

DRUM CREEK REMEDIATION, INCLUDING UNNAMED CREEK BETWEEN THE CONFLUENCE WITH DRUM CREEK AND THE MARTIN STREET CROSSING

Accepted Into
Administrative
Record File

FORMER NATIONAL ZINC SITE
Cherryvale, Montgomery County, Kansas

REVISED JULY 2006

Presented to:
Kansas Department of Health and Environment

Prepared by:
Salomon Smith Barney Holdings, Inc.
United States Steel Corporation

and

A and M Engineering and Environmental Services

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July 11, 2006

VIA FEDERAL EXPRESS

Mr. Kurt Limesand
Environmental Geologist
Bureau of Environmental Remediation
Kansas Department of Health and Environment
1000 Southwest Jackson, Ste. 410
Topeka, KS 66612-1366

RE: National Zinc Site, Cherryvale, Kansas
Consent Order Case No. 03-E-0022

Dear Mr. Limesand:

Enclosed are three copies of Supplement to RAD Report, Revised July 2006, covering Drum Creek Remediation, Including Unnamed Creek Between the Confluence with Drum Creek and the Martin Street Crossing, for the Former National Zinc Site at Cherryvale Kansas. These are being submitted on behalf of the Respondents, United States Steel Corporation and Salomon Smith Barney Holdings, Inc., pursuant to the captioned Consent Order.

Please give me a call if you have any questions.

Sincerely,
RESPONDENTS' PROJECT COORDINATOR,

Bill Anderson

William C. Anderson of
DOERNER, SAUNDERS, DANIEL & ANDERSON, L.L.P.

WCA/lks:532636.1
Enclosure

ENGINEER'S CERTIFICATION

I the undersigned, Turgay M. Ertugrul, a Registered Professional Engineer in the State of Kansas, P.E. No. 13212, and designated Professional Engineer to direct the technical work in conjunction with Consent Order Case No. 03-E-0222, hereby certify under penalty of law that this Supplement To Remedial Action Design Report for Drum Creek Remediation, including Unnamed Creek between the Confluence with Drum Creek and Martin Street Crossing and its attachments have been prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. In preparing this document and its attachments, conducting all of the required field work, gathering the required information and data to the best of my ability, I relied on and complied with the conditions and guidelines provided in Consent Order Case No. 03-E-0222 and its attachments, my continuous consultation with Kansas Department of Health and Environment (KDHE) officials and Respondents' (U.S. Steel Corporation and Salomon Smith Barney Holdings, Inc.) representatives, interpretation of all the applicable Federal and State of Kansas regulations and the acceptable engineering practices. I am aware that there are significant penalties in purposely submitting false information.

Turgay M. Ertugrul

Turgay M. Ertugrul, P.E. (Kansas P.E. No. 13212)
Vice President
A & M Engineering and Environmental Services, Inc.

1.0 Introduction

In July 2004 U.S. Steel Corporation and Salomon Smith Barney Holdings Inc. (Respondents) submitted to the Kansas Department of Health and Environment (KDHE) a Remedial Action Design Report (RAD) for the Former National Zinc Site at Cherryvale Montgomery County, Kansas (Site). By letter dated September 13, 2004 KDHE issued a "Notice of Approval" for the RAD Report, with certain conditions.

In the RAD Report, Respondents recommended removal of visible sediments from Unnamed Creek between the west boundary of the smelter Site and Highway 169, but recommended no action regarding the rest of Unnamed Creek and Drum Creek. One of the conditions included in KDHE's September 13, 2004 approval letter was the following:

> Page 3 of the RAD Report, last paragraph states "No action should be taken regarding any sediments in Drum Creek in view of the fact that the water quality in Drum Creek is not impacted by contaminants of concern, and sediment removal would be more harmful than leaving sediments in place." KDHE is unable to agree or disagree with the Respondents' comment at this time, however KDHE looks forward to discussing remedial options for Drum Creek following the completion of the proposed down-stream sampling.

Subsequent to its September 13, 2004 letter, KDHE held a public meeting on the RAD Report in December 2004 and took public comment. Additionally both the Respondents and KDHE have collected additional water quality and sediment data from Drum Creek.

This Supplement to Remedial Action Design Report (Supplement) is intended to amend the RAD Report to (1) present the additional data collected by the Respondents and KDHE, (2) present revised conclusions for Drum Creek south of the Confluence with Unnamed Creek (Confluence) and for the portion of Unnamed Creek extending from the Confluence to the Martin Street crossing into the EPA borrow area (Martin Street crossing) as shown in Figure 1, and (3) present revised recommendations for remediation of the portion of Unnamed Creek from the Martin Street Crossing to the Confluence and for Drum Creek south of the Confluence.

This Supplement will present sediment removal and containment alternatives, including a Preferred Alternative, which when implemented, will abate, prevent, minimize, or eliminate the environmental impacts (associated with heavy metal contamination contained in sediments) to local and downstream receptors.

The removal and containment alternatives developed in this Supplement are set forth in Section 4. In Section 4, the Respondents list and evaluate four candidate Remedial Alternative Action methods, and in Section 4.6 propose Alternative 3 (visible "Hotspot" sediment removal from Drum Creek and Unnamed Creek at the Confluence only and construction of the Catchment structure approximately 4.75 miles downstream from the Confluence) as their Preferred Alternative. Prior to preparing this Supplement, the

Respondents in a letter dated February 6, 2006 and its attachment (Design Basis Memorandum for Drum Creek Catchment) presented the Catchment design portion of the Preferred Alternative to KDHE for its review and approval. KDHE responded to the Respondents letter of February 6, 2006 with a letter dated March 21, 2006. In its letter, KDHE stated that it officially approved the design memorandum, providing that the Respondents provide information on the five comments listed in that letter. The Respondents in Section 4.7 of this Supplement provide information and a response to the five comments listed in KDHE's March 21, 2006 letter. Additionally, this Supplement has been updated and revised to include information and materials responsive to comments contained in KDHE's letter of June 9, 2006. Copies of the Respondents' February 6, 2006 letter and KDHE's letters of March 21, 2006 and June 9, 2006 are included in Appendix B of this Supplement.

The following is a summary of the principal components of the Preferred Alternative:

- Upon the approval of this Supplement by (KDHE), prepare and submit to KDHE a Remedial Action (RA) Plan for this Supplement.

- Obtain permits required for implementation of the Preferred Alternative, including the Army Corps of Engineers Section 404 Permit for sediment removal from the two creeks and for construction of the sediment Catchment facility on Drum Creek.

- Construct a sediment Catchment facility in Drum Creek approximately 4.75 miles downstream from the Confluence.

- Remove visible sediments from Unnamed Creek starting from the Martin Street Crossing and extending to the Confluence, and reshape and stabilize the slopes and bottom in the excavated areas with clean dirt as needed. Transport sediments to the Site for disposal.

- Repair the Martin Street crossing and place it in service as part of the access road system.

- Construct a temporary dike in Drum Creek between the Confluence and the City Outfall for flow control (flow control dike) to provide de-watering in the sediment removal area at the Confluence.

- De-water the area in Drum Creek between the Confluence and approximately 300 feet downstream. Reshape and stabilize creek banks as needed.

- Remove the visible sediments in Drum Creek between the Confluence and approximately 300 feet downstream, transport to the Site for disposal, and reshape and stabilize the creek bed as needed.

- Transport the sediments removed from Drum Creek and Unnamed Creek to the Site and place them in the old lagoon area under the clay cap system.

2.0 Description and History

The Former National Zinc Site is an old smelter Site located on the north side of the City of Cherryvale, Montgomery County, Kansas. The Site drains into Drum Creek via an intermittent stream known as Unnamed Creek. Drum Creek eventually empties into the Verdigris River approximately eleven miles south of the Confluence. Heavy metals have been detected in the sediments at varying concentrations in Drum and Unnamed Creeks.

2.1 Previous Studies and Sampling

Both Respondents and KDHE have conducted sampling of the sediments in Unnamed and Drum Creeks. The KDHE conducted sampling events in February of 2001, and November 2005. The Respondents conducted sampling events during 2003, 2004 and 2005. The results of sampling events that were conducted between 2001 and 2004 by both KDHE and the Respondents are included in the RAD Report (see Section 3.3.2. at pages 15 – 19 and tables referred to therein); therefore, that data is not included as part of this Supplement but is incorporated herein by reference.

Appendix A contains the analytical results from the sampling events conducted by the Respondents and KDHE subsequent to KDHE's September 13 approval letter. The original sampling discussed in the RAD Report was focused on water quality in relation to the heavy metal contamination in the sediments. It reached the conclusion that sediments did not impact the water quality, and the subsequent sampling events therefore focused on sediments in relation to biological impacts.

In May 2005 the KDHE, the Kansas Department of Parks and the United Stated Fish and Wildlife Service released their report concerning a preliminary biological assessment on Drum Creek upstream and downstream of the Confluence to determine natural resource damage from heavy metal contamination. The study covered habitat measurements, fish abundance and diversity, macroinverebrate diversity and abundance as well as other factors.

2.2 Discussion

Table 1 summarizes the sediment sampling data included in the approved RAD Report and in Appendix A of this Supplement. This table shows the heavy metal concentrations in background samples, the measured peak heavy metal concentrations and the heavy metal distribution in Drum Creek at the Confluence and at two downstream locations approximately 5 and 7 miles from the Confluence, respectively. Table 1 also lists the consensus based Probable Effect Concentrations (PEC's)* for comparison with background concentrations and concentrations in Drum Creek sediments downstream of the Confluence. In order to take into consideration the variations in laboratory results, the available data at each location was arranged as described in Table 1 footnotes.

*MacDonald, Ingersoll and Berger,
Development and Evaluation of Consensus – Based
Sediment Quality Guidelines for Freshwater Ecosystems, Archives of Environmental Contamination and Toxicology 39. 20-31 (2000), at. p.24.

TABLE 1

HEAVY METAL CONCENTRATION DISTRIBUTION IN DRUM CREEK SEDIMENT SAMPLES

	Background[1]	Peak Concentration[2] Confluence	Sampling Pt. #6[3] 5100 Road Bridge	Sampling Pt.#7[3] 4200 Road Bridge	Consensus Based PEC
Arsenic (mg/kg)	78.9	78.0	61.35	33.9	33.0
Cadmium (mg/kg)	4.72	160.9	7.5	4.72	4.98
Chromium (mg/kg)	37.5	90.3	28.9	30.8	111.0
Lead (mg/kg)	52.5	223.0	50.2	46.0	128.0
Zinc (mg/kg)	247.0	4,377.0	755.0	459.0	459.0

Notes:

1. Average of Green Country Testing and PACE Analytical Services, Inc. Laboratory results of samples taken on November 22, 2005 at sampling points #1 and #2 by KDHE and split samples provided to A & M Engineering.

2. Peak concentration results from KDHE sampling event in February 2001, and A & M Engineering sampling event in 2003.

3. Average of Green Country Testing and PACE Analytical Services, Inc. Laboratory results of samples taken on November 22, 2005 by KDHE and split samples provided to A & M Engineering.

The data included in Table 1, in the RAD Report and in the Appendix A of this Supplement establish the following:

1. The Arsenic concentrations in Drum Creek are impacted by other sources in addition to the Site. The background Arsenic levels in sediments are higher than the peak Arsenic levels measured in the sediments at the Confluence and are also higher than the PEC concentration of 33 mg/kg.

2. The peak Cadmium, Lead, and Zinc levels in the sediments at the Confluence are substantially higher than the measured background levels, therefore, this area is classified as a "Hot Spot". The " Hot Spot" area extends from the Martin Street Crossing to the Confluence and approximately 300 feet downstream in Drum Creek from the Confluence.

3. The Arsenic, Cadmium, Lead, and Zinc concentrations in sediments downstream from the Confluence get gradually lower and approach PEC levels in the vicinity of or slightly below the 5100 Road Bridge.

4. The Arsenic, Cadmium, and Lead concentrations in Drum Creek sediments attain background levels at the 4200 Road Bridge, approximately four miles before the Creek reaches the Verdigris River. Zinc concentrations at this point are approximately two times background, but are equal to PEC levels.

3.0 Remedial Action

The Respondents have reviewed and evaluated all of the information and data resulting from the studies conducted by both the Respondents and KDHE, and performed a thorough review of the available remedial action alternatives for remediating Drum Creek and the portion of Unnamed Creek between the Confluence and the Martin Street Crossing. Following this review, the Respondents have identified the following to be the most applicable and beneficial remedial alternative:

- Construct a sediment Catchment facility in Drum Creek approximately 4.75 miles downstream from the Confluence to capture upstream sediments and prevent their movement downstream.

- Remove all visible sediments in Unnamed Creek between the Martin Street Crossing and the Confluence (visible sediments have a distinct color and texture and are therefore easily identifiable; this will be confirmed at the pre-construction site meeting between KDHE, Respondents and their Contractor). Removal of all visible sediments from the portion of Unnamed Creek between the Site and Highway 169 has previously been recommended in the RAD Report and that recommendation is reaffirmed here. At this time, no action is recommended on the portion of Unnamed Creek between Highway 169 and the Martin Street Crossing since the creek bed in this segment is largely bedrock and Respondents do not believe that it contains any visible sediments. This portion of the Unnamed Creek will be inspected by KDHE, Respondents and their Contractor in a pre-construction

meeting at the Site to jointly determine if any visible sediments are present that require removal.

- Install the temporary flow control dike below the City Outfall and above the Confluence for dewatering purposes.

- Remove all visible sediments in Drum Creek from the Confluence to approximately 300 feet downstream from the Confluence.

- Dispose of all sediments removed from Drum Creek and Unnamed Creek beneath the cap to be constructed on the old lagoon area on the Site.

3.1 Sediment Removal

Removal of the sediments from Unnamed Creek between Martin Street Crossing and the Confluence will be accomplished by building a staging area approximately 50 feet east of the Confluence (see Figures 2, 3 and 3 continued). The Unnamed Creek bottom is wide enough to accommodate a dozer and track loader. The sediments will be excavated by use of a dozer and transported to a constructed staging area for loading on dump trucks for transporting to the Site. The staging area surface will contain a liner and proper drainage control to contain the excavated sediments. Storm water and the drained water from the stockpiled sediments at the staging area will be collected in a sump and pumped back into Drum Creek following a reasonable settling time. The transported sediments will be placed on the old lagoon area at the site and capped.

The side slopes of the segments of Unnamed Creek which currently are vegetated, and where the vegetation is disturbed by sediment removal, will be revegetated.

Removing the sediments from the Confluence to the 300 foot mark downstream in Drum Creek will be accomplished by building a temporary flow control dike above the Confluence. The water will be pumped out of the work area to below the 300 foot mark, which is the end of the sediment excavation zone. A separate pump will be installed upstream of the flow control dike for controlling the incoming water to the Confluence. The constructed temporary dike will have the capacity to hold approximately three days of city discharge capacity. The estimated amount of sediment removal from the Drum Creek Confluence is approximately 2200 cubic yards. The sediments will be excavated and placed on strategically placed staging areas (shown on Figures 2 and 3) constructed with a liner, loaded on dump trucks and transported and disposed on the old lagoon area. Clean soil will be placed as necessary to reshape and maintain the creek slopes.

A Catchment structure on Drum Creek located approximately 4.75 miles downstream from the Confluence will be constructed at the location shown on Figures 4 and 5. This sediment Catchment structure will be constructed in accordance with the Engineering Design and Specifications shown in Figure 6. The sediment Catchment structure includes two dikes constructed from R-7 riprap that will have 12" to 30" (average 15") stone size and FS-3 crushed stone filter material, which will have maximum 6.5" (average 2.5") size rock. The dikes are designed to withstand a maximum of 15 ft./sec. stream flow velocity.

3.2 Endangered Species

Montgomery County, Kansas currently has three species listed as endangered or protected. They are the Bald Eagle, American Burying Beetle, and the Neosho Mucket. The type of construction activities proposed for the creek bottoms of these two creeks will not be a threat to the existence of the Bald Eagle or to the American Burying Beetle. The Neosho Mucket which is endemic to the Neosho and Verdigris basins of the Arkansas River Systems in Oklahoma, Kansas, Missouri and Arkansas, is currently known to exist in the Verdigris River but is not known to occur in Drum Creek, and none have been observed in the area of the Confluence and the Catchment area. The type of construction proposed in this RAD Report will not pose a threat to the existence of the Neosho Mucket.

4.0 Removal Action Alternatives

Candidate Remedial Alternative Action Methods Considered:

1. No Action
2. Visible Sediment Removal only at the Confluence
3. Visible Sediment Removal only at the Confluence and Sediment Containment
4. Dredge Drum Creek and Unnamed Creek at the Confluence and all of Drum Creek from the Confluence to the Highway 5100 bridge (approximately 5 miles of stream bed).

4.1 Alternative 1 - No Action

The "No Action" Alternative is not considered as a viable option. Leaving the contaminated sediments in place will likely result in additional dissemination of heavy metals in Drum Creek and therefore will increase the environmental risk and concerns.

4.2 Alternative 2 - Visible Sediment Removal only at the Confluence

This Alternative includes removal of visible sediments from the "Hot Spot" which consists of the segment of Unnamed Creek between Martin Street Crossing and Drum Creek and a segment of Drum Creek between the Confluence and extending approximately 300 ft. downstream. The removed sediments will be transported to the Site and placed on the old lagoon area under a clay cap.

Access into Drum Creek and Unnamed Creek to perform the sediment removal can be accomplished with minimal damage to the stream banks and the trees and other plant system on the banks. As the "Hot Spot" area is de-watered, fish in the area will be collected and moved above the temporary de-watering dike. Removal of the sediments will be destructive to organisms in the sediments, but this will be limited to the combined stretch of approximately 600 feet of creek bed in the "Hot Spot" area where metal concentrations are high. Therefore, sediment removal from the limited "Hot Spot" area can be accomplished with minimal impact on the creek ecosystem.

Sediments with lower metal concentrations located below the "Hot Spots" area would be left in place and would gradually dissipate over time by natural attenuation.

This Alternative eliminates the sediments from the designated "Hot Spot" area but does not control the possibility of downstream migration of metal bearing sediments now located below the "Hot Spot" area, nor prevent the possibility of those sediments moving below the point near the 5100 Road Bridge where sediment metal concentrations approach PEC levels. Therefore this Alternative, by itself, is not the Preferred Alternative.

4.3 Alternative 3 -Visible Sediment Removal only at the Confluence and Sediment Containment

This Alternative includes the sediment removal from the Unnamed Creek and Drum Creek "Hot Spot" as described in Alternative 2 above and adds the additional feature of sediment containment by first constructing a sediment Catchment structure in Drum Creek approximately 4.75 miles downstream from the Confluence. The sediment Catchment structure as shown on Figure 6 includes two dikes constructed from R-7 riprap and F5-3 crushed stone filter material. The upstream dike is 3ft. high, 8 ft. wide on the top with 2:1 side slopes. The downstream dike is 50ft. downstream from the first dike and is 2ft. high with 4ft. width at the top and with 2:1 side slopes. The sediment Catchment basin created between the two dikes will have a sediment storage capacity of approximately 350 c.y.

This Alternative will remove the visible sediments from the "Hot Spot" area. It will also prevent the possibility that sediments below the "Hot Spot" area, which are considerably lower in metal concentration than those in the "Hot Spot" area, could migrate past the Catchment area. It will thus protect the area below the Catchment, which is now at or below PEC levels, from the possibility of further metal impact while the portion of Drum Creek above the Catchment undergoes gradual clean up over time by the process of natural attenuation. It also avoids the destruction of the Creek ecosystem, which would be caused by wholesale dredging (see Alternative 4 below) of the sediments from the entire stretch of Drum Creek from the "Hot Spot" area to the proposed location of the Catchment. It is therefore the Recommended Preferred Alternative action method (Preferred Alternative).

4.4 Alternative 4 – Dredge Drum Creek and Unnamed Creek at the Confluence and all of Drum Creek from the Confluence to the 5100 Road Bridge

Dredging Drum Creek from the Confluence to 5100 Road Bridge (approximately a total of five miles) and Unnamed Creek at the Confluence would definitely remove the sediments from Drum Creek. However, this would cause a total ecological disaster for Drum Creek. The stream ecosystem would be essentially destroyed, and adjoining properties would also suffer significant impacts due to construction activities. Further, this Alternative would cost approximately 25 times more than the Preferred Alternative method – see Table 2. There is no need to incur the ecological destruction and excessive cost of this Alternative when the Preferred Alternative is available and will be effective.

4.5 Cost Comparison and Evaluation of Alternatives

Table 2 presents the estimated cost calculations for implementing each Alternative evaluated as a potential method for the Drum Creek remediation. Table 3 presents a comparison and evaluation of the candidate Alternatives.

4.6 Preferred Alternative

Respondents propose Alternative 3 (visible "Hot Spot" sediment removal only from Drum Creek and Unnamed Creek at the Confluence, and construction of Catchment structure approximately 4.75 miles downstream from the Confluence) as the Preferred Alternative for Drum Creek remediation.

4.7 KDHE Approval of the Catchment Basin Design

In its letter dated March 21, 2006 KDHE officially approved the Catchment basin design provided that the comments listed in KDHE's letter are addressed to KDHE's satisfaction. Information requested by KDHE in its March 21, 2006 letter concerning the "Design Basis Memorandum for Drum Creek Catchment" was set forth in five comments. The following lists the five comments from KDHE followed by the Respondents' response to each comment.

Comment 1.

KDHE recommends that the Respondents discuss with various state and federal entities that regulate or govern surface water drainage systems. Permits for stream modification and diversion may be required. Recommended contacts include: Corps of Engineers and Kansas Department of Agriculture/Division of Water Resources. Please provide documentation that these entities have been contacted and copies of signed permits that are required to complete the project. KDHE cannot provide final approval of this project until this information is provided.

The Kansas Department of Wildlife and Parks should also be contacted since the proposed two-dyke design may hinder or inhibit the migration of fish during normal flow conditions. Please provide documentation of this contact.

Response 1.

Respondents will prepare and submit a section 404 permit application to the U.S. Army Corps of Engineers, Kansas City Region for the removal of sediments from the Confluence area (Drum Creek from the Confluence downstream approximately 300 feet and Unnamed Creek from the Confluence to the Martin Street crossing), and for the construction of the sediment Catchment basin. The U.S. Army Corps of Engineers as part of its standard operating procedures will identify and notify any agencies with jurisdictional interest and ask for their response in writing for their comments and their approval of the proposed project. Respondents will answer any questions these agencies may have and obtain their approval of the project and submit their correspondence to the U.S. Army Corps of

Engineers and to KDHE. The Kansas Department of Wildlife and Parks and Kansas Department of Agriculture/Division of Water Resources are among the agencies required by the U.S. Army Corps of Engineers, Kansas City region to be contacted.

Comment 2.

According to the design memorandum, the Respondents are working on obtaining access to the Catchment basin area. It is important to note that the road access will be necessary to the Catchment basin area to allow periodic cleanout of the upstream side of both dykes. Potential high water conditions and wash-out of access roads should be considered.

Response 2.

In their access agreements with the landowners Respondents have obtained access to sufficient land area for not only construction but also for servicing the Catchment. The easements will continue in effect as long as necessary to service the Catchment. Respondents will remove any significant accumulation of sediments that are found during periodical inspections that have accumulated within 25 feet north of the north dike. The determination as to whether to remove any sediments will be made jointly with KDHE based on observations and information gathered during the inspections. Copies of the access agreements and easements necessary to implement, operate and maintain all aspects of the Preferred Alternative will be furnished to KDHE.

Comment 3.

The Respondents should further explain the methodology used in determining the maximum stream flow of 15 feet per second and the ability of the two-dyke system to withstand this flow rate and the effect of higher flow rates on contaminated sediment accumulated in the Catchment basin system.

Response 3.

The size of riprap being proposed in constructing the two dykes associated with the sediment Catchment design is R-7. The design manual prepared by the National Crushed Stone Association for constructing Erosion and Sediment Control Structures is projecting that R-7 riprap will withstand a maximum flow velocity of 15 ft./sec. flow rate. The maximum flow velocity during a 100 year flood flow of approximately 35,000 $ft.^3$/sec. is calculated to be approximately 13 ft./sec which is less than 15 ft./sec. We believe that the two dike sediment Catchment system provides a very effective design for trapping the sediments in the stream under laminar and turbulent flow conditions. The periodical removal of sediments from north of the north dike during February and August (see response to comment 4 below, as well as at Paragraph 2 and 3 of Section 7.0 below) will minimize the effects of any scouring of the sediments in the creek bed during high flow conditions.

Comment 4.

Ideally the Catchment basin should be constructed prior to in-stream sediment removal of the unnamed tributary and hot spots along Drum Creek to capture potentially contaminated sediments that are mobilized during the sediment removal process. Potentially, contaminated sediments would be contained by the Catchment basin to prevent further impact to Drum Creek downstream of the Catchment basin area. Please provide a schedule of the remedial action including Catchment basin construction and in-stream sediment removal.

Response 4.

The sediment Catchment basin will be constructed prior to any sediment removal at the Confluence. The construction schedule is presented in Section 5.

Section 7, provides for inspection and if necessary cleanout of the Catchment as well as the 25 feet north of the north Catchment dike during February and August, which, based on statistical information, are the months most likely to predate potential flood periods and minimize scouring of accumulated sediments by high flow conditions.

Comment 5.

An adequate monitoring system should be established for the project. This includes pre-construction monitoring to establish a baseline of stream conditions (this data has already been collected by KDHE and the Respondents), monitoring during construction activities to document potential contaminated sediment migration downstream, post-construction monitoring to document conditions following sediment removal activities and finally long term monitoring to document natural recovery over the long term (Monitored Natural Recovery). The project schedule should include these monitoring events.

Response 5.

Section 7 outlines the monitoring system for pre-construction, during sediment removal activities and post-construction.

5.0 Construction and Schedule

It is anticipated that the Drum Creek remediation, including construction of the Catchment, will occur during the first six months of the smelter site remediation project, after the Site preparation in the lagoon area has been completed and it is available to receive both site residues as well as sediments from Drum Creek and Unnamed Creek. The sediment Catchment basin will be constructed before any sediment removal activity takes place at the Confluence area.

The anticipated duration of field work and construction activities for completing the Drum Creek Remediation project is 2 to 3 months (excluding the duration for finalizing access agreements and obtaining the required permits), depending on the stream flow conditions.

TABLE 2
COST ESTIMATE CALCULATIONS FOR REMEDIAL ACTION ALTERNATIVES FOR DRUM CREEK SEDIMENT CONTROL

1.	No Action:	
		No Cost
2.	Visible Sediment Removal Only at the Confluence (Drum Creek and Unnamed Creek)	
a.	Sediment Removal from Unnamed Creek at the Confluence:	
	Operation duration 7 days @ $6,000/day	$ 42,000
	Grading riverbed 500 cy @ $15.00/cy	7,500
	Service road construction	14,000
	Clearing trees	6,000
	Transportation of the excavated sediments 500 cy @ $9.00/cy	4,500
	Placement of the sediments in disposal area 500 cy @ $3.00/cy	1,500
	Engineering Supervision	6,000
	Subtotal	81,500
b.	Sediment Removal from Drum Creek at the Confluence:	
	Road construction	15,000
	Clearing Trees	5,000
	Dike construction	28,000
	Pumping and maintenance of the work area	18,000
	Excavation of 2,200 cy sediments 18 days @ $7,000/day	126,000
	Transportation of the sediments 2,200 cy @ $7.00/cy	15,400
	Grading with clean soil 500 cy @ $15.00/cy	9,600
	Placement of the sediments in disposal area 2,200 cy @ $3.00/cy	6,600
	Engineering Supervision	8,000
	Subtotal	231,600
	TOTAL	$ 313,100
3.	Visible Sediment Removal Only at the Confluence (Drum Creek and Unnamed Creek) and Sediment Containment (1 Sediment Containment Structure):	
a.	Sediment Removal from Unnamed Creek at the Confluence:	
	(Same as Alternative 2a)	81,500
b.	Sediment Removal from Drum Creek at the Confluence:	
	(Same as Alternative 2b)	231,600
c.	Sediment Containment Structure:	
	Riprap 850 tons @ $38.00/ton	32,300
	Filter Stone 100 tons @ $30.00/ton	3,000
	Site slope preparation	3,500
	Subbase Preparation	3,000
	Entrance Road Construction	10,000
	Engineering Supervision	5,200
	Subtotal	57,000
	TOTAL	$ 370,100

TABLE 2 CONTINUED
COST ESTIMATE CALCULATIONS FOR REMEDIAL ACTION
ALTERNATIVES FOR DRUM CREEK SEDIMENT CONTROL

4.	Dredging Drum Creek from Confluence to 5100 Road Bridge Including the Unnamed Creek Confluence:	
a.	Sediment Removal from Unnamed Creek at the Confluence:	
	(Same as Alternative 2a)	81,500
b.	Drum Creek (26,400 L.F., 90 Ft Wide, and 2 Ft of Sediments):	
	Total Volume of Sediment Excavation:	
	176,000 C.Y. @ $22.00/C.Y.	3,872,000
	Transportation and Disposal at the Site:	
	176,000 C.Y. @ $25.00/C.Y.	4,400,000
	Creek Bed Restoration	550,000
	Engineering Design and Supervision	300,000
	Subtotal	9,122,000
	Total	$9,203,500

TABLE 3
CANDIDATE REMEDIAL ALTERNATIVE ACTION METHODS FOR DRUM CREEK REMEDIATION

Alternative Method	Regulatory Acceptability	Implementability	Meeting Respondents and Regulatory Objectives	Cost	Recommendations
1 - No Action	Not Acceptable	Implementable; however, does not remediate anything	Respondents: Yes Regulators: No	No Cost	Not Recommended
2 - Visible Sediment Removal Only at the Confluence (Drum Creek and Unnamed Creek)	Not Acceptable	Implementable; however, does not provide an effective remedial solution	Respondents: Yes Regulators: No	$313,000	Not Recommended
3 - Visible Sediment Removal Only at the Confluence (Drum Creek and Unnamed Creek) and Sediment Containment (1 Sediment Containment Structure)	Acceptable	Implementable; provides an effective remedial solution	Respondents: Yes Regulators: Yes	$370,000	Recommended
4 - Dredging Drum Creek from Confluence to HWY 160 Bridge Including the Unnamed Creek Confluence	Not Acceptable	Very hard to implement; environmentally not acceptable	Respondents: No Regulators: No	$9,200,000	Not Recommended

6.0 Remedial Action (RA) Plan Outline for Implementing the Preferred Alternative

The following presents an outline by tasks of a preliminary RA Plan for Implementation of the Preferred Alternative method for remediation of Drum Creek, including Unnamed Creek from the Confluence to the Martin Street crossing.

Task 1. Identify property owners whose permission for access will be required to implement the Preferred Alternative and finalize access agreements.

Task 2. Obtain permits required to complete the Preferred Alternative including Army Corps of Engineers Section 404 Permit and review by Kansas Department of Wildlife and Parks and Kansas Department of Agriculture/Division of Water Resources.

Task 3. Construct road and entryway into Drum Creek for Sediment Catchment Dikes located north of 5100 Road Bridge. Figure 3.

Task 4. Construct Sediment Catchment dikes in Drum Creek. Figure 6.

Task 5. Construct service road for maintenance of Catchment.

Task 6. Obtain a composite sediment sample from Catchment basin to establish baseline conditions.

Task 7. The Martin Street and Unnamed Creek crossing will be repaired to accommodate heavy equipment movement.

Task 8. Construct an access road and the staging area for Unnamed Creek. Figures 2 and 3.

Task 9. Construct temporary flow control dike in Drum Creek up stream of the Confluence.

Task 10. De-water the Drum Creek sediment removal area at the Confluence.

Task 11. Remove visible sediments from the Unnamed Creek area and place sediments on staging area for transportation and disposal at the Site.

Task 12. Construct access road and prepare staging areas for sediment removal from Drum Creek between Confluence and approximately 300 feet downstream.

Task 13. Remove visible sediments from Confluence to approximately 300 feet downstream and place in staging areas for transportation and disposal at the Site. Reshape Drum Creek and Unnamed Creek slopes, creek bed and place clean soil as needed.

Task 14. Obtain a composite sediment sample from Catchment to evaluate the impact of sediment removal from the Confluence.

Task 15. Prepare the Engineers Certification describing, and documenting the work performed and certifying the completion of the project.

7.0 Operation and Maintenance (O & M) of Catchment

Following the completion of the sediment removal in Drum Creek and Unnamed Creek, restoration will be such that no maintenance will be needed for the creeks themselves.

The Catchment will require periodical inspection and maintenance. Respondents are proposing the following steps for operating and maintaining the Catchment.

1. The Catchment basin will be constructed before any sediment removal activity takes place at the Confluence. Prior to start up of any sediment removal activity, one composite sediment sample will be taken from the Catchment basin after construction in order to establish the baseline conditions for lead, arsenic, cadmium and zinc.

   Following the completion of the sediment removal activities at the Confluence, another composite sediment sample will be taken from the Catchment basin and analyzed for lead, arsenic, cadmium and zinc to monitor for potential contamination migration.

2. In the months of February and August after construction of the Catchment, and until on-site construction is completed, the Catchment and the 25 feet area north of the north Catchment dike will be inspected. On these inspections, sediment samples will be collected and analyzed for lead, arsenic, cadmium and zinc. Additionally, the volume of sediments that have collected in the Catchment will be measured, and in conjunction with KDHE, a determination will be made as to whether this volume of accumulated sediments is such as to indicate removal. The removed sediments will be placed in the lagoon area facility prior to closing the cap. Also, during the approximate one year period between construction of the Catchment and completion of project construction, the Catchment will be inspected quarterly for stability/integrity of the system, and any needed repairs will be made.

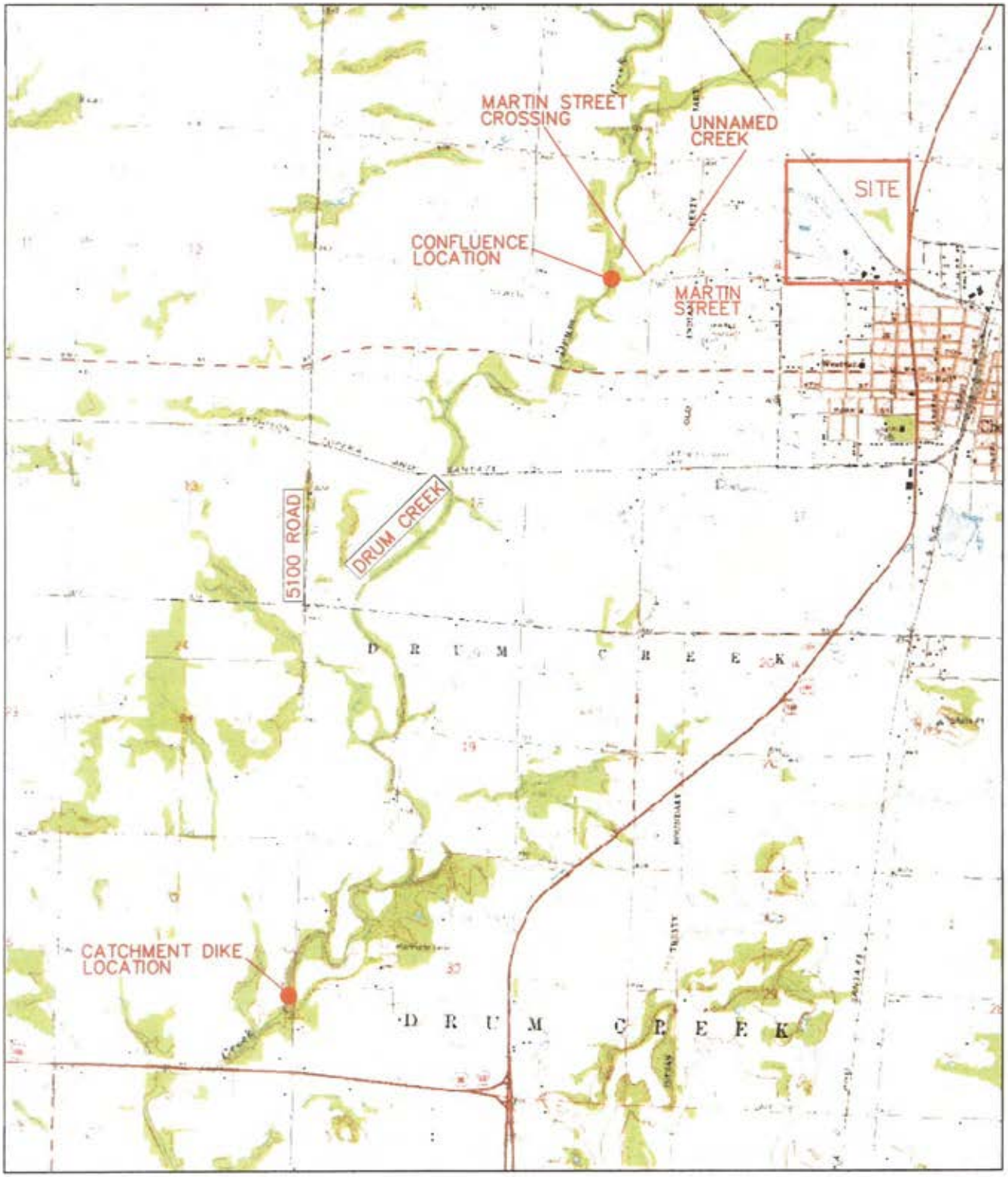
3. During the months of February and August in the first year after completion of the project, the Catchment and the 25 feet area north of the north dike will be inspected and sediments removed as determined in conjunction with KDHE. The disposal location for any sediments that are removed will be decided after communication with KDHE. Also, any repairs needed to maintain system stability/integrity will be made.

4. Following each of the above referenced inspections, an inspection report will be prepared and submitted to KDHE including sediment measurements, analytical sample results, volume of sediment removed, if any, and repairs made to the Catchment system, if any.

5. After completion of the inspection to be conducted one year after completion of project construction as discussed in paragraph 3 above, the Respondents will analyze the data accumulated from all inspections and submit a report to KDHE making recommendations as to future operation of the Catchment. Respondents

shall evaluate all potential options, including termination of O & M activities on the Catchment as well as continuing O & M for a recommended period of time.

The sampling methodology for taking, transporting and analyzing the sediment samples will be included in the Drum Creek Remedial Action Plan which will be prepared following KDHE approval of this Supplement and prior to start up of construction activities.



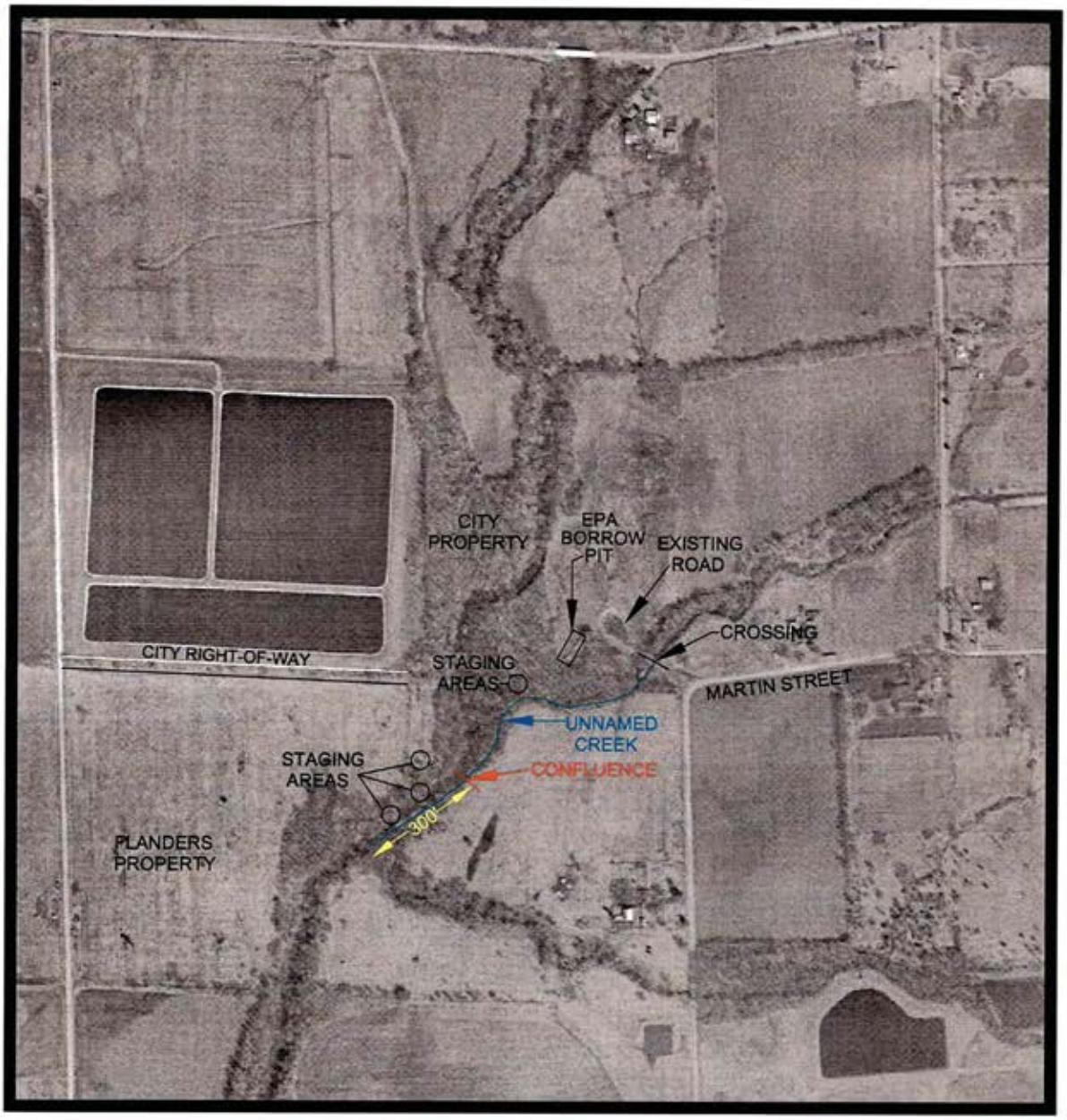
NORTH

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

LOCATION MAP

SCALE:	DATE:	FIGURE NO.
NOT TO SCALE	04/04/06	FIGURE 1
APPROVED BY:	DRAWN BY:	PROJECT NO.
AME	TME	1804-003



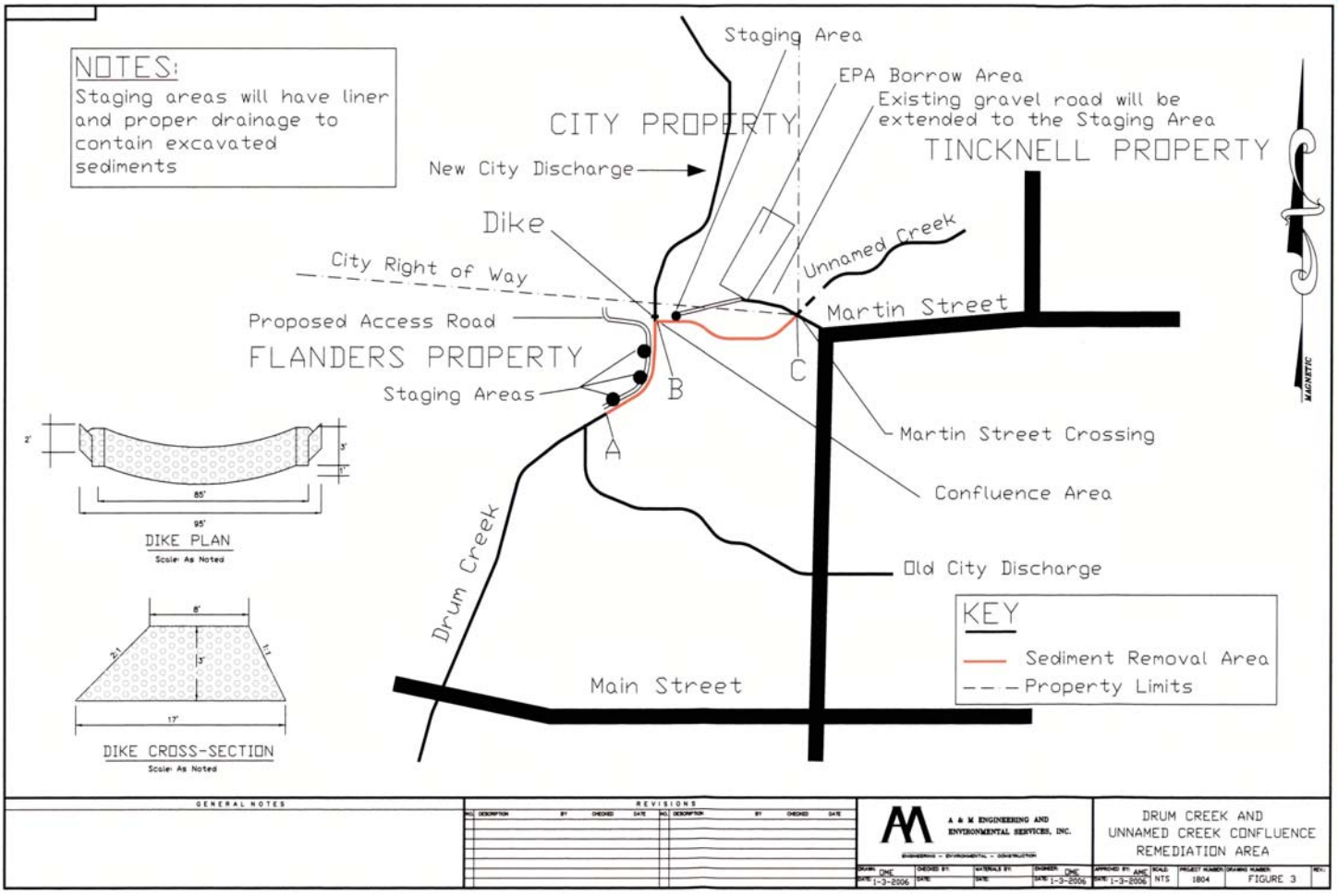
NORTH

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

AERIAL PHOTO (FIGURE 2)
OF DRUM CREEK AND UNNAMED CREEK CONFLUENCE

SCALE: NOT TO SCALE	DATE: 1/25/06
APPROVED BY: AME	DRAWN BY: TME



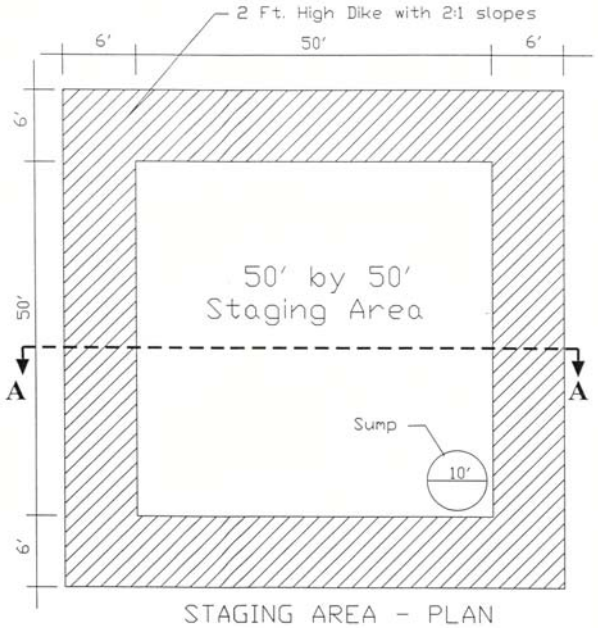
GENERAL NOTES

REVISIONS

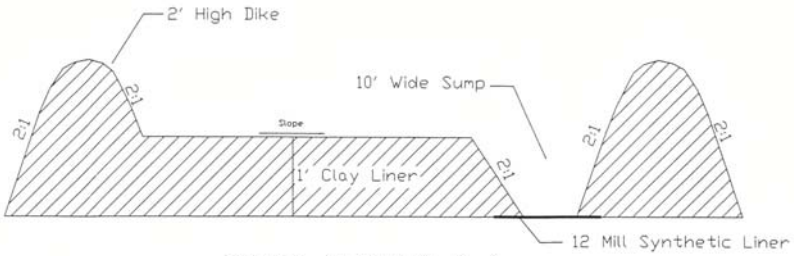
A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRUM CREEK AND UNNAMED CREEK CONFLUENCE REMEDIATION AREA

DRAWN BY	CHECKED BY	MATERIALS BY	ENGINEER	APPROVED BY	SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
DME 1-3-2006			DME 1-3-2006	AME 1-3-2006	NTS	1804	FIGURE 3	



STAGING AREA - PLAN



CROSS-SECTION A-A

CONSTRUCTION NOTES:

1. Staging Area will be contained with a 2 ft. high dike constructed with 2:1 slopes.
2. Drainage at the Staging Area will be contained in Sumps and pumped back into the Creek.
3. A 12 mill synthetic liner may be used instead of Clay Liner in final design of dikes and bottom of Staging Areas.

GENERAL NOTES

REVISIONS

NO.	DESCRIPTION	BY	CHECKED	DATE	NO.	DESCRIPTION	BY	CHECKED	DATE

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

PLAN OF THE STAGING AREAS
DRUM & UNNAMED CREEKS
CHERRYVALE, KANSAS

DRAWN BY	CHECKED BY	MATERIALS BY	ENGINEER	APPROVED BY	SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
DME DATE 6-12-2006	DATE	DATE	DME DATE 6-12-2006	AME DATE 6-12-2006	NTS	1884	FIGURE 3 (Cont'd)	

Note:
Access Road and Staging Area is within Hudson Property.

GENERAL NOTES

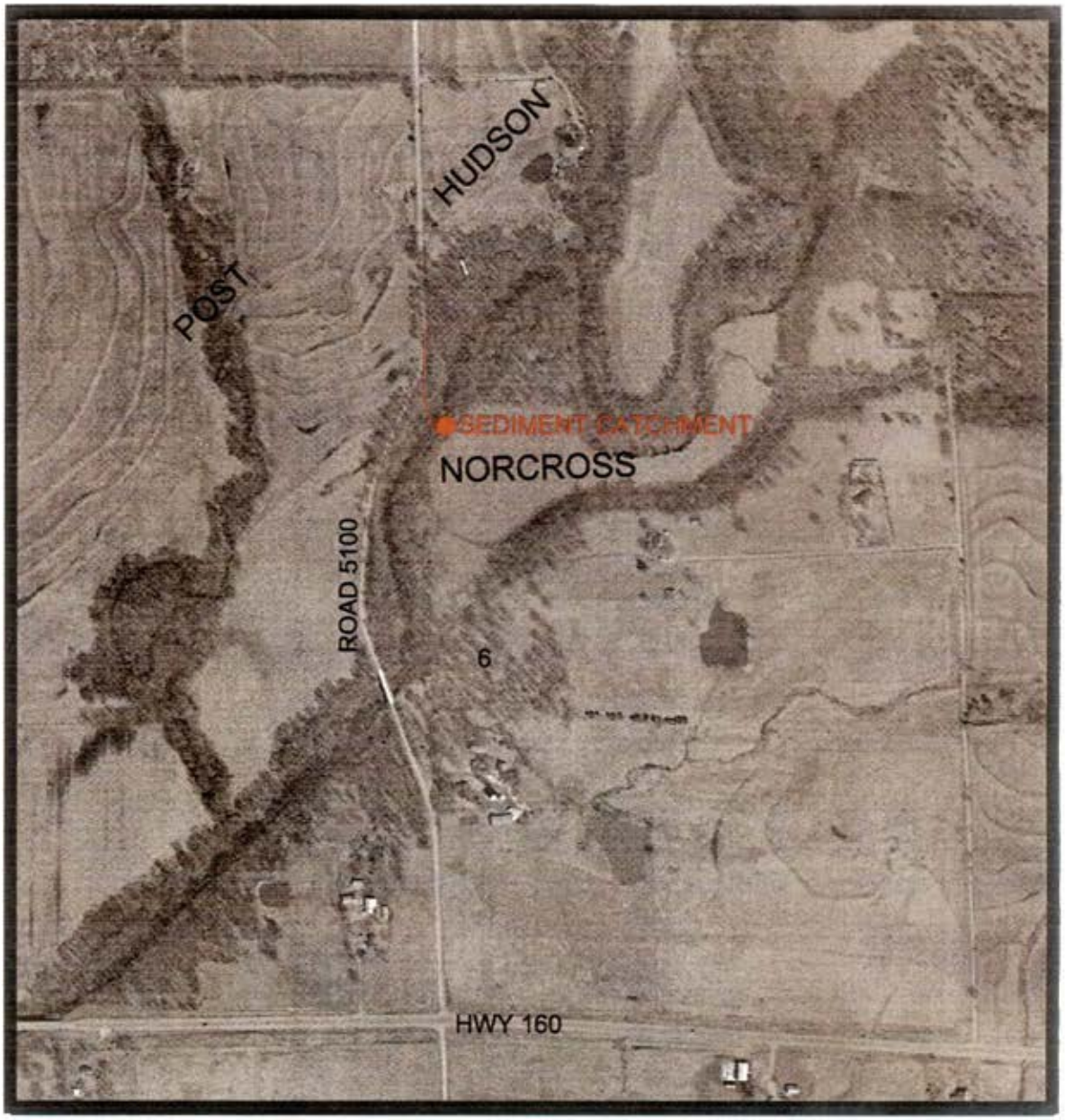
REVISIONS

NO.	DESCRIPTION	BY	CHECKED	DATE	NO.	DESCRIPTION	BY	CHECKED	DATE

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

DRAWN BY	CHECKED BY	MATERIALS BY	ENGINEER	APPROVED BY	SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
DMC DATE 1-27-2006	DATE	DATE	DMC DATE 1-27-2006	AMC DATE 1-27-2006	NTS	1804	FIGURE 5	

SEDIMENT CATCHMENT LOCATION



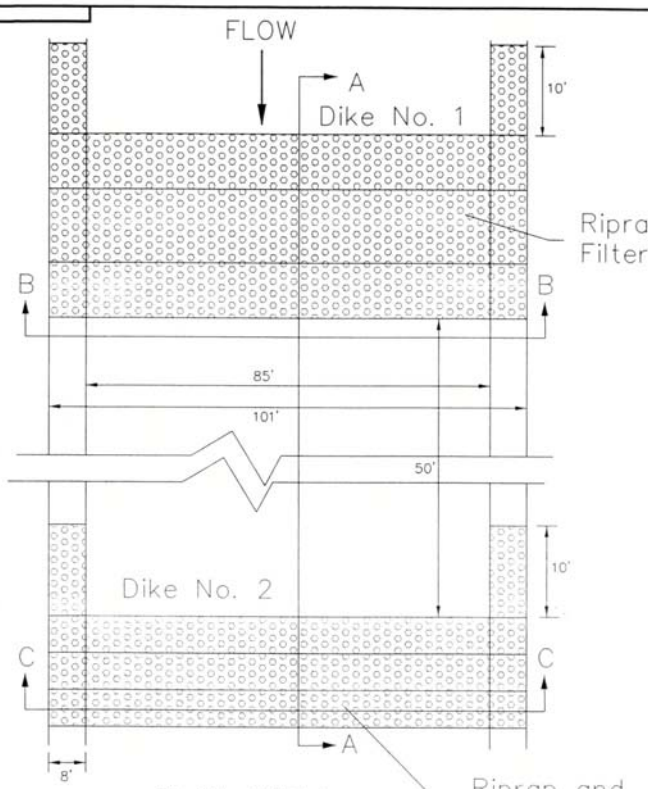
NORTH

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

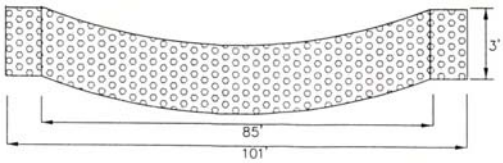
AERIAL PHOTO (FIGURE 4)
OF SEDIMENT CATCHMENT LOCATION

SCALE: NOT TO SCALE	DATE: 1/25/06
APPROVED BY: AME	DRAWN BY: TME



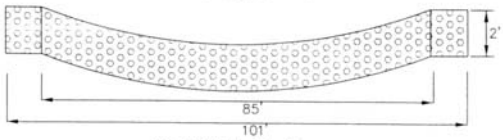
PLAN VIEW

Scale: X Axis 1" = 20'
Y Axis 1" =10'



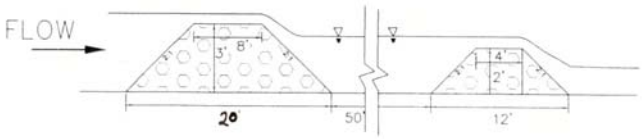
SECTION B-B

Scale: Horizontal 1" = 20'
Vertical 1" = 4'



SECTION C-C

Scale: Horizontal 1" = 20'
Vertical 1" = 4'



SECTION A-A

Scale: Horizontal 1" = 8'
Vertical 1" = 4'

NOTES:

1. All Riprap will be R-7 that will have 12" to 30" (average 15") stone size.
2. Filter stone will be FS-3 that will have max. 6.5" (average 2.5") rock size.
3. Adequate amount of filter stone will be placed to the bottom of the dikes to prevent washing out of the banks and bottom materials.

GENERAL NOTES

REVISIONS

NO.	DESCRIPTION	BY	CHECKED	DATE	NO.	DESCRIPTION	BY	CHECKED	DATE

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING • ENVIRONMENTAL • CONSTRUCTION

DRAWN BY	CHECKED BY	MATERIALS BY	ENGINEER
OME	AME	AME	OME
DATE 1/12/2005	DATE 1/12/2005	DATE 1/12/2005	DATE 1/12/2005

SEDIMENT CATCHMENT DIKE
NATIONAL ZINC SITE
CHERRYVALE, KANSAS

APPROVED BY	SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
AME DATE 1/12/2005		1804	FIGURE 6	

APPENDIX A
Analytical Data

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
Phone: (913)599-5665
Fax: (913)599-1759

December 01, 2005

Mr. Rob Bixby
KDHE
1000 SW Jackson Ave.
Topeka, KS 66614

RE: Project: 602296
Project ID: NATIONAL ZINC

Dear Mr. Bixby:

Enclosed are the analytical results for sample(s) received by the laboratory on November 23, 2005. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Angie Brown
angela.brown@pacelabs.com

Arkansas Certification Number: 05-008-0
California Certification Number: 02109CA
Illinois Certification Number: 001191
Iowa Certification Number: 118
Kansas/NELAP Certification Number: E-10116
Louisiana Certification Number: 03055
Minnesota Certification Number: 020-999-394
Oklahoma Certification Number: 9205/9935
Utah Certification Number: 9135995665

Enclosures

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Fax: (913)599-1759

SAMPLE SUMMARY

Project: 602296
Project ID: NATIONAL ZINC

Lab ID	Sample ID	Matrix	Date Collected	Date Received
602296001	#1	Solid	11/22/05 11:50	11/23/05 14:10
602296002	#2	Solid	11/22/05 11:40	11/23/05 14:10
602296003	#3	Solid	11/22/05 12:15	11/23/05 14:10
602296004	#4	Solid	11/22/05 12:20	11/23/05 14:10
602296005	#5A	Solid	11/22/05 13:35	11/23/05 14:10
602296006	#6	Solid	11/22/05 13:50	11/23/05 14:10
602296007	#7	Solid	11/22/05 14:10	11/23/05 14:10
602296008	#8	Solid	11/22/05 14:40	11/23/05 14:10
602296009	#9	Solid	11/22/05 15:10	11/23/05 14:10

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SAMPLE ANALYTE COUNT

Project: 602296
Project ID: NATIONAL ZINC

Lab ID	Sample ID	Method	Analytes Reported
602296001	#1	ASTM D2974-87	1
		EPA 6010	5
602296002	#2	ASTM D2974-87	1
		EPA 6010	5
602296003	#3	ASTM D2974-87	1
		EPA 6010	5
602296004	#4	ASTM D2974-87	1
		EPA 6010	5
602296005	#5A	ASTM D2974-87	1
		EPA 6010	5
602296006	#6	ASTM D2974-87	1
		EPA 6010	5
602296007	#7	ASTM D2974-87	1
		EPA 6010	5
602296008	#8	ASTM D2974-87	1
		EPA 6010	5
602296009	#9	ASTM D2974-87	1
		EPA 6010	5

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ANALYTICAL RESULTS

Project: 602296
Project ID: NATIONAL ZINC
The solid samples are reported on a dry weight basis.

Lab ID: 602296001 Date Collected: 11/22/05 11:50 Matrix: Solid
Sample ID: #1 Date Received: 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	108	mg/kg	12.3	10	11/29/05 00:00	SYW	11/30/05 14:44	TJG	7440-38-2		
Cadmium	ND	mg/kg	6.1	10	11/29/05 00:00	SYW	11/30/05 14:44	TJG	7440-43-9	2	
Chromium	38.9	mg/kg	6.1	10	11/29/05 00:00	SYW	11/30/05 14:44	TJG	7440-47-3		
Lead	72.3	mg/kg	6.1	10	11/29/05 00:00	SYW	11/30/05 14:44	TJG	7439-92-1		
Zinc	369	mg/kg	123	10	11/29/05 00:00	SYW	11/30/05 14:44	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	20.1	%	0.10	1			11/28/05 00:00	AJA			

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Phone: (913)599-5665
Fax: (913)599-1759

ANALYTICAL RESULTS

Project: 602296
Project ID: NATIONAL ZINC
The solid samples are reported on a dry weight basis

Lab ID: 602296002 Date Collected 11/22/05 11:40 Matrix Solid
Sample ID: #2 Date Received 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	48.3	mg/kg	11.3	10	11/29/05 00:00	SYW	11/30/05 15:01	TJG	7440-38-2		
Cadmium	ND	mg/kg	5.7	10	11/29/05 00:00	SYW	11/30/05 15:01	TJG	7440-43-9	2	
Chromium	26.0	mg/kg	5.7	10	11/29/05 00:00	SYW	11/30/05 15:01	TJG	7440-47-3		
Lead	51.6	mg/kg	5.7	10	11/29/05 00:00	SYW	11/30/05 15:01	TJG	7439-92-1		
Zinc	323	mg/kg	113	10	11/29/05 00:00	SYW	11/30/05 15:01	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	23.1	%	0.10	1			11/28/05 00:00	AJA			

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Lenexa, KS 66219

Phone: (913)599-5665
Fax: (913)599-1759

ANALYTICAL RESULTS

Project: 602296

Project ID: NATIONAL ZINC

The solid samples are reported on a dry weight basis.

Lab ID: 602296003 Date Collected: 11/22/05 13:15 Matrix: Solid

Sample ID: #3 Date Received: 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	87.5	mg/kg	12.4	10	11/29/05 00:00	SYW	11/30/05 15:07	TJG	7440-38-2		
Cadmium	13.3	mg/kg	6.2	10	11/29/05 00:00	SYW	11/30/05 15:07	TJG	7440-43-9		
Chromium	38.8	mg/kg	6.2	10	11/29/05 00:00	SYW	11/30/05 15:07	TJG	7440-47-3		
Lead	114	mg/kg	6.2	10	11/29/05 00:00	SYW	11/30/05 15:07	TJG	7439-92-1		
Zinc	1420	mg/kg	124	10	11/29/05 00:00	SYW	11/30/05 15:07	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	27.3	%	0.10	1			11/28/05 00:00	AJA			

REPORT OF LABORATORY ANALYSIS

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Lenexa, KS 66219
Phone: (913)599-5665
Fax: (913)599-1759

ANALYTICAL RESULTS

Project: 602296
Project ID: NATIONAL ZINC
The solid samples are reported on a dry weight basis

Lab ID: 602296004 Date Collected: 11/22/05 12:20 Matrix: Solid
Sample ID: #4 Date Received: 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	116	mg/kg	11.1	10	11/29/05 00:00	SYW	11/30/05 15:12	TJG	7440-38-2		
Cadmium	27.3	mg/kg	5.5	10	11/29/05 00:00	SYW	11/30/05 15:12	TJG	7440-43-9		
Chromium	39.7	mg/kg	5.5	10	11/29/05 00:00	SYW	11/30/05 15:12	TJG	7440-47-3		
Lead	133	mg/kg	5.5	10	11/29/05 00:00	SYW	11/30/05 15:12	TJG	7439-92-1		
Zinc	1230	mg/kg	111	10	11/29/05 00:00	SYW	11/30/05 15:12	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	30.1	%	0.10	1			11/28/05 00:00	AJA			

REPORT OF LABORATORY ANALYSIS
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nelac

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219

Phone: (913)599-5665
Fax: (913)599-1759

ANALYTICAL RESULTS

Project: 602296

Project ID: NATIONAL ZINC

The solid samples are reported on a dry weight basis.

Lab ID: 602296005 Date Collected: 11/22/05 13:35 Matrix: Solid

Sample ID: #5A Date Received: 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	129	mg/kg	8.5	10	11/29/05 00:00	SYW	11/30/05 15:27	TJG	7440-38-2		
Cadmium	26.4	mg/kg	4.3	10	11/29/05 00:00	SYW	11/30/05 15:27	TJG	7440-43-9		
Chromium	42.8	mg/kg	4.3	10	11/29/05 00:00	SYW	11/30/05 15:27	TJG	7440-47-3		
Lead	145	mg/kg	4.3	10	11/29/05 00:00	SYW	11/30/05 15:27	TJG	7439-92-1		
Zinc	1860	mg/kg	85.3	10	11/29/05 00:00	SYW	11/30/05 15:27	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	14.5	%	0.10	1			11/28/05 00:00	AJA			

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ANALYTICAL RESULTS

Project 502296
Project ID: NATIONAL ZINC
The solid samples are reported on a dry weight basis.

Lab ID: 502296006 Date Collected: 11/22/05 13:50 Matrix: Solid
Sample ID: #6 Date Received: 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	78.3	mg/kg	10.7	10	11/29/05 00:00	SYW	11/30/05 15:33	TJG	7440-38-2		
Cadmium	7.5	mg/kg	5.4	10	11/29/05 00:00	SYW	11/30/05 15:33	TJG	7440-43-9		
Chromium	27.1	mg/kg	5.4	10	11/29/05 00:00	SYW	11/30/05 15:33	TJG	7440-47-3		
Lead	67.0	mg/kg	5.4	10	11/29/05 00:00	SYW	11/30/05 15:33	TJG	7439-92-1		
Zinc	925	mg/kg	107	10	11/29/05 00:00	SYW	11/30/05 15:33	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	19.6	%	0.10	1			11/28/05 00:00	AJA			

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ANALYTICAL RESULTS

Project: 602296
Project ID: NATIONAL ZINC
The solid samples are reported on a dry weight basis.

Lab ID: 602296007 Date Collected: 11/22/05 14:10 Matrix: Solid
Sample ID: #7 Date Received: 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	35.1	mg/kg	2.7	2	11/29/05 00:00	SYW	11/30/05 15:39	TJG	7440-38-2		
Cadmium	ND	mg/kg	1.3	2	11/29/05 00:00	SYW	11/30/05 15:39	TJG	7440-43-9	1	
Chromium	24.8	mg/kg	1.3	2	11/29/05 00:00	SYW	11/30/05 15:39	TJG	7440-47-3		
Lead	47.4	mg/kg	1.3	2	11/29/05 00:00	SYW	11/30/05 15:39	TJG	7439-92-1		
Zinc	406	mg/kg	26.6	2	11/29/05 00:00	SYW	11/30/05 15:39	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	25.4	%	0.10	1			11/28/05 00:00	AJA			

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ANALYTICAL RESULTS

Project: 602296
Project ID: NATIONAL ZINC
The solid samples are reported on a dry weight basis.

Lab ID: 602296008 Date Collected: 11/22/05 14:40 Matrix: Solid
Sample ID: #8 Date Received: 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	31.1	mg/kg	4.0	5	11/29/05 00:00	SYW	11/30/05 15:45	TJG	7440-38-2		
Cadmium	ND	mg/kg	2.0	5	11/29/05 00:00	SYW	11/30/05 15:45	TJG	7440-43-9	2	
Chromium	41.1	mg/kg	2.0	5	11/29/05 00:00	SYW	11/30/05 15:45	TJG	7440-47-3		
Lead	24.1	mg/kg	2.0	5	11/29/05 00:00	SYW	11/30/05 15:45	TJG	7439-92-1		
Zinc	95.7	mg/kg	40.2	5	11/29/05 00:00	SYW	11/30/05 15:45	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	9.1	%	0.10	1			11/28/05 00:00	AJA			

REPORT OF LABORATORY ANALYSIS
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Appendix B
Design Basis Memorandum for Catchment Basin
and KDHE approval with comments

DOERNER, SAUNDERS, DANIEL & ANDERSON, L.L.P.
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JAMES F. HARVEY, III

R. J. DOERNER (1897-1989)
DICKSON M. SAUNDERS (1920-2001)

February 6, 2006

VIA EMAIL AND FEDERAL EXPRESS
Mr. Kurt Limesand
Environmental Geologist
Bureau of Environmental Remediation
Kansas Department of Health and Environment
1000 Southwest Jackson, Ste. 410
Topeka, KS 66612-1366

RE: National Zinc Site, Cherryvale, Kansas
Consent Order Case No. 03-E-0022

Dear Kurt:

Following up on our telephone conference of January 27, 2006, A&M has prepared a Design Basis Memorandum for the sediment catchment in Drum Creek. That Memorandum is attached to this letter, and I'm also transmitting three hard copies of it by Federal Express. You will note that there are also three attachments to the Memorandum, namely, an aerial photograph showing the catchment location, an engineering drawing showing the catchment system, and a site drawing showing access into the catchment and the approximate staging area. These are submitted for KDHE's review on the understanding that if KDHE approves the enclosures, there will only be one catchment required in Drum Creek and that no long term monitoring of Drum Creek sediments downstream from the catchment location will be required. The only other contingency from Respondents' perspective is the finalization of access agreements with the necessary land owners. As is stated in the Memorandum, we are in the process of obtaining these and hope to finalize them in the near future. We will notify you as soon as that has occurred.

A&M is currently working on a Supplement to the RAD report providing for the remediation of Drum Creek. We hope to complete that document within the next few weeks. Assuming that the access agreements have been finalized by then, the Respondents are prepared

to submit the Supplement to KDHE once we receive notice that KDHE has approved the enclosures.

The one open item at the conclusion of our conference last week was a proposal for operation and maintenance of the catchment. The following is an outline of the Respondents' proposal on this point:

1. It is anticipated that the Drum Creek remediation, including construction of the catchment, will occur during the first six months of the smelter site remediation project, after the site preparation in the lagoon area has been completed and it is available to receive both site residues as well as sediments from Drum Creek and Unnamed Creek.

2. Approximately six months after construction of the catchment, and approximately six months later near the completion of project construction, the catchment will be inspected. On both of these inspections, sediment samples will be collected and analyzed for lead, arsenic, cadmium and zinc. Additionally, the volume of sediments that have collected in the catchment will be measured, and if the catchment is at least half full (approximately 175 c.y.), the catchment will be cleaned out and the sediments placed in the lagoon area facility prior to closing the cap. Also, during the approximately one year period between construction of the catchment and completion of project construction, the catchment will be inspected quarterly for stability/integrity of the system, and any needed repairs will be made.

3. Approximately one year after completion of project construction, the catchment will be inspected. Again, if the catchment is more than half full, it will be cleaned out and the sediments placed on the smelter site in any open area not in use so long as ground contours are not disturbed and ground cover is restored. Also, any repairs needed to maintain system stability/integrity will be made.

4. Following each of the above referenced inspections, an inspection report will be prepared and submitted to KDHE including sediment measurements, analytical sample results, volume of sediment removed, if any, and repairs made to the catchment system, if any.

5. After completion of the inspection to be conducted one year after completion of project construction as discussed in paragraph 3 above, the Respondents will analyze the data accumulated from all inspections and submit a report to KDHE making recommendations as to future operation of the catchment. Respondents shall evaluate all potential options, including termination of O&M activities on the catchment as well as continuing O&M for a recommended period of time.

We would appreciate your comments on the enclosures and on the proposed O&M outline set forth above. As previously noted, the Respondents are prepared to promptly submit the Supplement to the RAD report as soon as KDHE has approved the enclosure and the O&M outline, with any amendments that may be acceptable to all parties. If you have any questions, please give me a call.

Sincerely,

Bill Anderson

William C. Anderson of
DOERNER, SAUNDERS, DANIEL & ANDERSON, L.L.P.

WCA:sm

cc: Rick Bean (w/encl.) – Via Email
Robert Bixby (w/encl.) – Via Email
Erika Bessey, Esq. (w/encl.) – Via Email
Ellen O'Brien, Esq. (w/encl.) – Via Email
David Smiga, Esq. (w/encl.) – Via Email
Mark Rupnow (w/encl.) – Via Email
Rick Menozzi (w/encl.) – Via Email
Altay Ertugrul (w/encl.) – Via Email

424109.1

Design Basis Memorandum For Drum Creek Catchment

Kansas Department of Health and Environment ("KDHE") does not have any design guidance regarding stream sediment catchments. The design for the Drum Creek ("Creek") catchment facility has therefore been developed based on principles of good engineering practice.

The Creek catchment facility will be located in Section 30, T32, R17, Montgomery County, Kansas, approximately 4.5 miles downstream from the confluence of the Creek and Unnamed Creek. The approximate location of the catchment (the "Location") is shown on the enclosed aerial photograph. It is approximately one quarter mile north of KDHE sample location 6 and near the mid-point of the west section line of Section 30. At the Location, the Creek is approximately 85 feet wide, the banks are approximately 25 feet high, and the bottom is composed largely of slate rock. It has not been possible to observe the Location under normal flow conditions, since due to the lack of rain in recent weeks, the Creek has been in low flow. However, based on observations during normal flow of other areas of the Creek of similar width and topography, it is estimated that during normal flow, the Creek is approximately one foot deep at the Location, and stream flow velocity is approximately two to three feet per second.

Initial conversations with the appropriate landowners regarding access to the Location for construction and maintenance access as well as permission to construct the catchment in the Creek have been favorable. Written agreements to confirm these conversations are now being prepared.

The catchment will consist of two dikes constructed approximately 50 feet apart. The first or upstream dike will be one foot higher than the downstream dike, and the concept is that the first dike will cause upstream ponding to occur and thus lower the velocity of stream water as it passes over the first dike. As this occurs during moderate to high flow conditions, the water passing over the first dike will shift from laminar flow to turbulent flow for about 15 feet south of the first dike. It will then revert to laminar flow for the rest of the length of the catchment. This process of changing from laminar to turbulent and back to laminar flow conditions will allow sediments to settle out and be trapped in the catchment.

The height of the upstream dike is three feet, with a width of six feet and side slopes of 2:1. The dike will be constructed with R-7 riprap with 12" to 30" (average 15") stone size. Smaller FS-3 stone (maximum 6.5" and average 2.5") will also be used for filter purposes. The upstream dike is designed to withstand high flow conditions (maximum of 15 feet/second stream flow velocity).

The second or downstream dike is also designed with R-7 riprap and FS-3 filter stone. It will be two feet high, with a width of four feet and side slopes of 2:1. It is also designed to withstand high flow conditions (maximum of 15 feet/second).

The two dike catchment system is designed to withstand the impact of stream water during high flow conditions, and will have the capacity to store approximately 350 c.y. of

sediments between the two dikes. Loose pieces of slate rock now in the Creek bottom will be collected during construction and placed on the upstream side of the first dike to help armor it against the impact of high flow conditions.

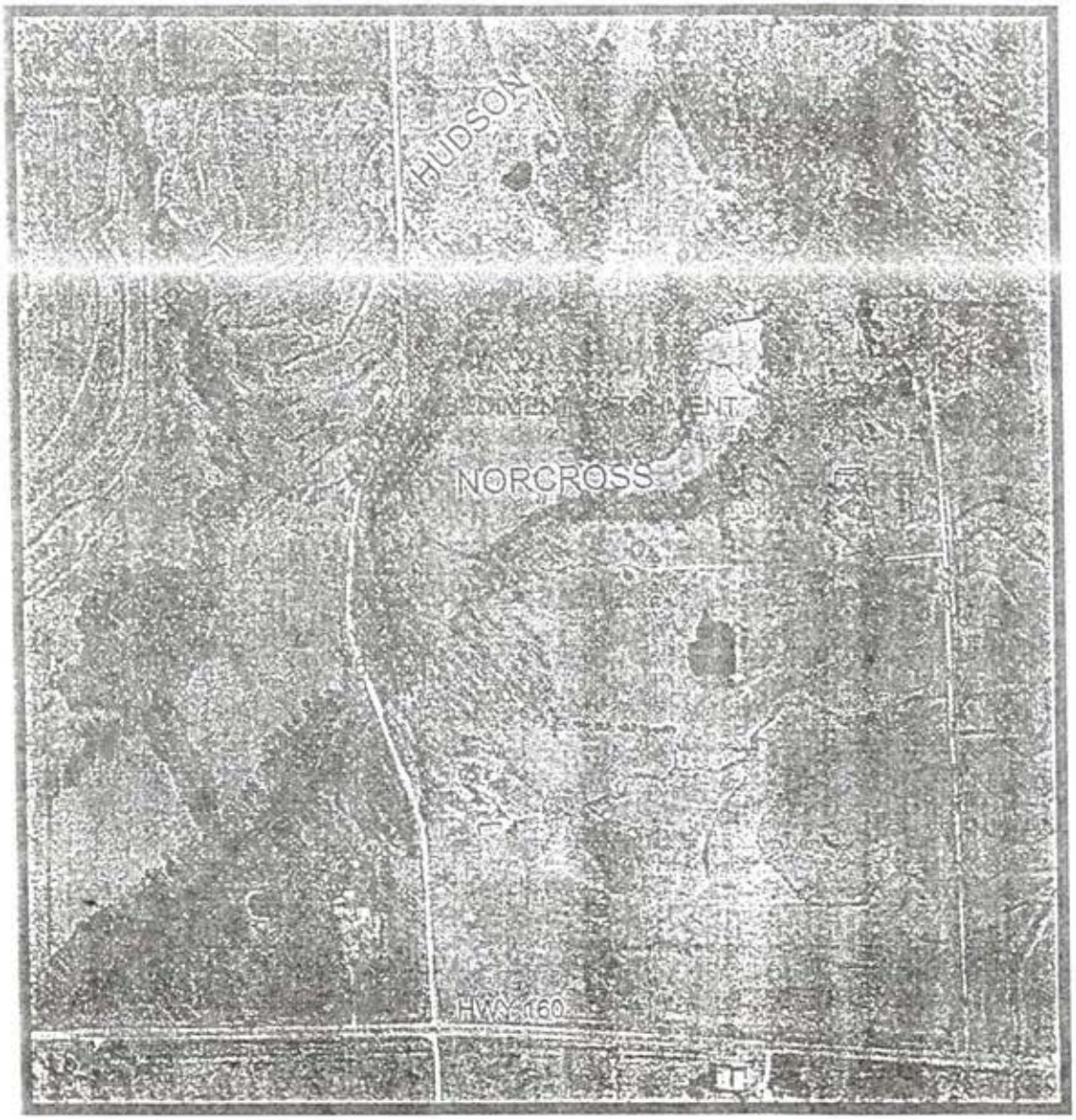
It is required that there be some differential between the heights of the two dikes in order to create the flow condition described above during moderate to high flow conditions (change from laminar to turbulent and back to laminar flow). Of necessity, the higher dam must be upstream; if the higher dam was downstream, ponded water would inundate the upstream dam.

There are two principal limiting factors regarding the height of the upstream dike. First, three feet is judged to be the maximum that stream bed stability conditions will allow without serious risk of being eroded by high flow conditions. Secondly, a dike in excess of three feet would likely not receive Corps of Engineer approval. The Corps will not want the upstream dike to alter the 100 year flood plain elevation, i.e., the Corps will not want too much water ponded upstream of the first dike.

Regarding the distance between the two dikes, the principal requirement is that there be sufficient distance to (1) allow the flow condition to change from laminar to turbulent and back to laminar flow, and (2) allow an additional distance for settlement to occur and provide for adequate storage of sediments. A total of 50 feet is judged to be sufficient for these purposes (storage will be approximately 350 c.y.). Also, as a practical matter, site topography at the Location realistically limits the length of the two dike facility to approximately 50 feet.

Lastly, operation and maintenance of the catchment facility appears optimal. Because of the largely slate bottom between the two dikes, it will be feasible to drive equipment directly into the Creek to clean out any sediments that collect there and are required to be removed.

In addition to the aerial photograph referenced above, there is also attached to this the Memorandum an engineering drawing of the two dike catchment system, together with a site drawing showing the access road into the catchment and the approximate staging area.

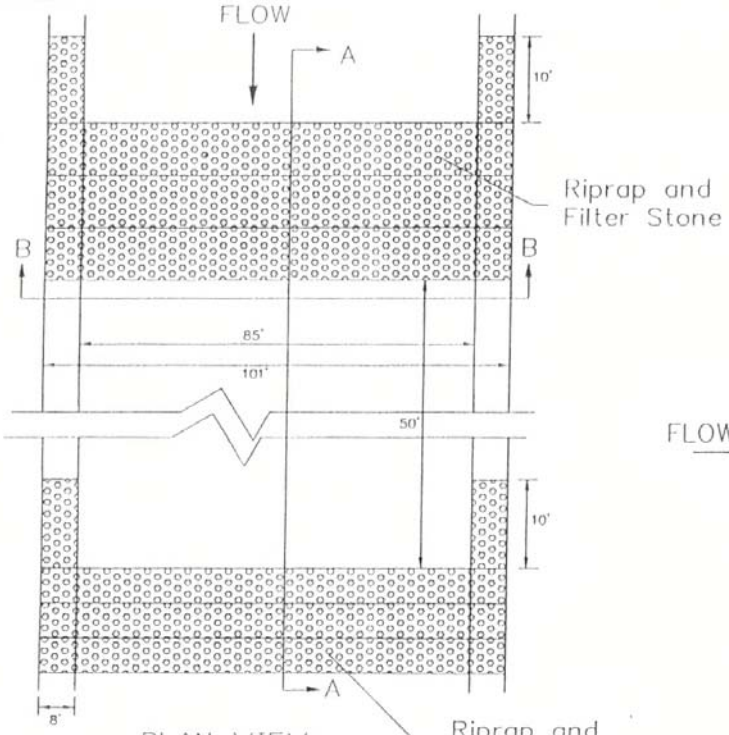


A & M ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

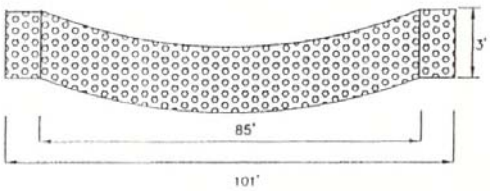
AERIAL PHOTO (FIGURE 3)

SCALE: NOT TO SCALE	DATE: 1/25/06
APPROVED BY: AME	DRAWN BY: TME



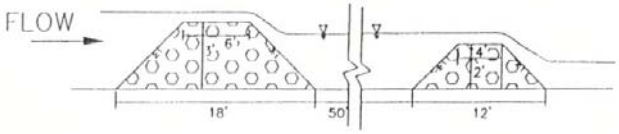
PLAN VIEW

Scale: X Axis 1" = 20'
Y Axis 1" =10'



SECTION B-B

Scale: Horizontal 1" = 20'
Vertical 1" = 4'



SECTION A-A

Scale: Horizontal 1" = 8'
Vertical 1" = 4'

NOTES:

1. All Riprap will be R-7 that will have 12" to 30" (average 15") stone size.
2. Filter stone will be FS-3 that will have max. 6.5" (average 2.5") rock size.

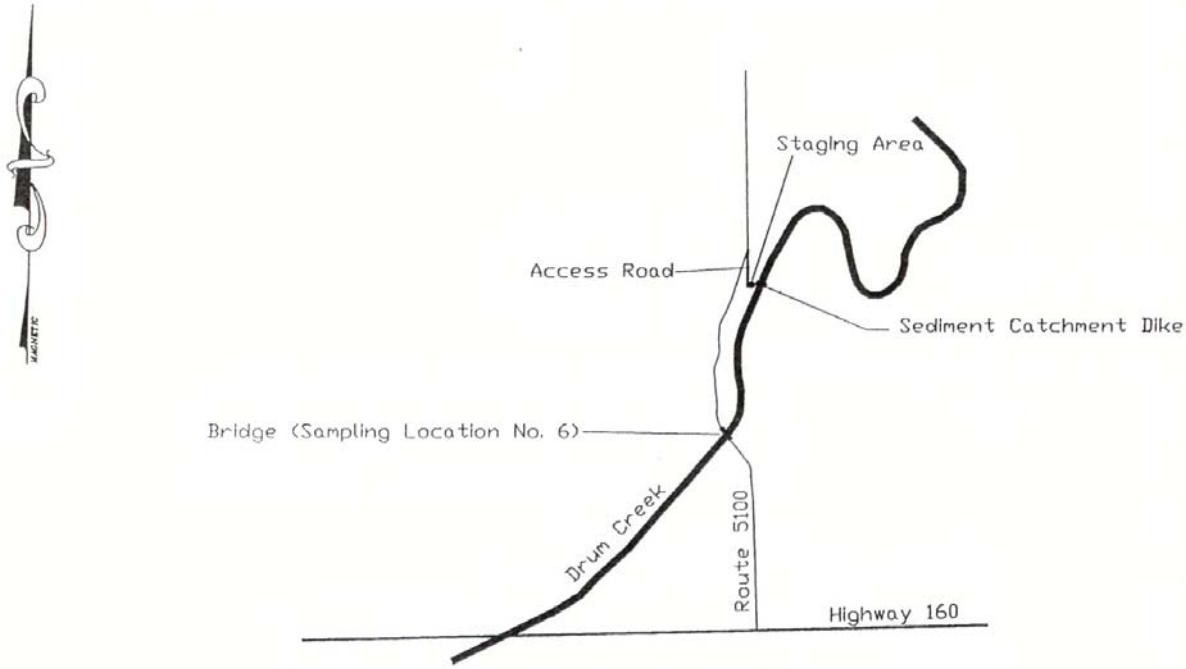
GENERAL NOTES

REVISIONS

J & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

SEDIMENT CATCHMENT DIKE
NATIONAL ZINC SITE
CHERRYVALE, KANSAS

1804 FIGURE



GENERAL NOTES

REVISIONS

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

PLAN
NATIONAL ZINC SITE
CHERRYVALE, KANSAS

FIGURE 1

4. Ideally the catchment basin should be constructed prior to in-stream sediment removal of the unnamed tributary and hot-spots along Drum Creek to capture potentially contaminated sediments that are mobilized during the sediment removal process. Potentially contaminated sediments would be contained by the catchment basin to prevent further impact to Drum Creek downstream of the catchment basin area. Please provide a schedule of the remedial action including catchment basin construction and in-stream sediment removal.

5. An adequate monitoring system should be established for the project. This includes pre-construction monitoring to establish a baseline of stream conditions (this data has already been collected by KDHE and the Respondents), monitoring during construction activities to document potential contaminated sediment migration downstream, post-construction monitoring to document conditions following sediment removal activities and finally long-term monitoring to document natural recovery over the long term (Monitored Natural Recovery). The project schedule should include these monitoring events.

As stated in previous conversations and correspondence, KDHE does not have official guidance for the construction of a catchment basin. The ultimate closure of this portion of the National Zinc project will be based on the successful performance of the constructed system and effectiveness of the contaminated sediment removal activities. Natural recovery of Drum Creek will be time dependent and will be influenced by the successful implementation of the remedy. Long-term monitoring of the stream regime will be evaluated by KDHE to determine effectiveness of this remedy.

As you know, Mr. Rob Bixby is no longer with KDHE and we are in the process of hiring a replacement. In the interim, please direct all future correspondence to Kurt Limesand or myself.

Sincerely,

Rick L. Bean, L.G.
Chief, Remedial Section
Bureau of Environmental Remediation

RLB/lb

CC: Kurt Limesand → file (063-00026)

RODERICK L. BREMBY, SECRETARY

K A N S A S

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

June 9, 2006

William C. Anderson
320 S. Boston Avenue, Suite 500
Tulsa, OK 74103-3725

David L. Smiga
600 Grant Street, Room 1500
Pittsburgh, PA 15219-2800

Subject: Supplement to Remedial Action Design Report, National Zinc Site, Cherryvale, KS

Dear Sirs:

The Kansas Department of Health and Environment (KDHE) has reviewed the supplemental Remedial Action Design Report for the (former) National Zinc Site in Cherryvale, Kansas. That document was submitted to KDHE in April 2006 on behalf of United States Steel Corporation and Salomon Smith Barney Holdings, Inc. by A and M Engineering and Environmental Services. KDHE herein offers its comments on the supplemental proposal for cleanup of sediment contamination in Drum Creek and the unnamed tributary that drains the Site.

1. Section 2.2, Page 6 – The contention concerning elevated arsenic upstream of the confluences of unnamed tributary and Drum Creek remains speculative as historical drainage patterns to the north, as well as, the legacy of airborne particulate emissions from the smelter facility may have affected sediment quality. Nevertheless, KDHE and Respondents have agreed in principle to the broad scope of the cleanup proposal, and KDHE believes the proposal is a reasonable best effort to restore the surface water bodies.

2. Section 3.0, Page 6 – The text indicates no sediments are visible between Highway 169 and the Martin Street crossing, and therefore none will be removed. KDHE requests to have a field consultation with the Respondents' representative at the time of the cleanup mobilization to verify this conclusion. KDHE further requests that Respondents make reasonable efforts to remove any sediment within this reach, as contaminant levels would likely be elevated in this area.

DIVISION OF ENVIRONMENT
Bureau of Environmental Remediation
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE. 410, TOPEKA, KS 66612-1367
Voice 785-296-1673 Fax 785-296-7030 http://www.kdheks.gov

3. Section 3.0, Page 7 – The determination of "visible sediments" is not defined. The text does not explain whether the extent of sedimentation has been determined based on the presence of sediments or whether the visible sediments are defined by some quality factor, such as color or texture. KDHE requests that at the time of cleanup mobilization we meet on site to inspect and agree on the extent of sediment removal, as the current assessment of its extent was made by A&M without KDHE's concurrence. Based on A&M's contentions to date about the occurrence of sediment accumulation in this reach, it is unlikely that inspection would result in a significant increase in scope, volume, or cost of the contaminated sediment removal project.

4. Section 3.1, Page 7 – Provide more detail on the proposed sediment staging area. The text indicates storm water will be piped to Drum Creek. The KDHE Bureau of Water (BOW) has requested the stockpile be bermed, and that an appropriately sized sedimentation basin be constructed to allow settling of fines prior to discharge of any water from the stockpile back to Drum Creek.

5. In discussing the stockpile issue with KDHE/BOW, it became apparent that KDHE/BER had failed to identify the need for a construction stormwater permit for the project as a whole. In general, sedimentation basins are required for construction projects that will disturb more than 10 acres of ground. Less control may be necessary if efforts are made to divert extraneous drainage from upgradient of the construction project. Portions of the unnamed tributary that are currently vegetated should be revegetated to minimize erosion following the sediment removal project. Eric Staab is the KDHE/BOW contact for construction stormwater permits, (785) 296-4347, email estaab@kdhe.state.ks.us.

6. Page 12, Response 2 – The plan indicates the Respondents do not intend to remove sediments from upstream of the north catchment dike. The determination as to whether cleanout of that portion of the catchment system is warranted should be based on observation and testing. KDHE will require that any accumulated contaminated sediments be removed.

7. Page 12, Response 3 – The response provided is unsatisfactory. How was the 100-year flood condition flow rate calculated, and what effect will that flow rate have on accumulated sediments in the catchment? KDHE's concern is that high flow events may not affect the riprap dike structures, but may scour out the accumulated contaminated sediments upstream of the two dikes.

8. Page 19, Section 7.0, Operation and Maintenance of Catchment - Inspection and cleanout of the catchment system should be conducted prior to the onset of potential flood event seasons to minimize catastrophic scouring of accumulated sediments in the structure. The United States Geological Survey monthly surface water statistics for the area suggest that February and August are the lowest flow months preceding the onset of rainy seasons in the area. The proposal in bullet 3 to

place excavated sediments on site would necessitate careful testing of the removed sediments to establish that the concentrations in the material are consistent with potential future use and Environmental Use Controls for the site. The areas proposed for placement of the sediments should be protected from surface scour and off-site redeposition. Respondents should consider disposing the dredge material at a permitted landfill, as this may result in fewer management complications in the long-term. Finally, it is KDHE's expectation that the catchment structure will be operated and maintained until testing of the sediments in the targeted areas, including the catchment basin, have been restored through downstream transport and removal to concentrations protective of aquatic biota. KDHE has agreed to use the MacDonald et al consensus-based Probable Effect Concentrations as the ultimate cleanup goal for sediments in Drum Creek.

Please provide a response to these comments at your earliest convenience. If Respondents are in agreement with KDHE's comments, you may also proceed to submit a revised Remedial Action Design report reflecting these comments. KDHE will begin preparing a draft Removal Action Decision for the overall project and will provide you the opportunity to review that document prior to commencement of the public comment period. Please feel free to call me at (785) 296-1671 or e-mail me at klimesan@kdhe.state.ks.us, if I may provide any more information. I will be out of town from June 12th to the 21st; please feel free to contact Rick Bean at (785) 296-1675, rbean@kdhe.state.ks.us, if you have any concerns.

Sincerely,

Kurt Limesand
Environmental Geologist
Bureau of Environmental Remediation

KWL/lb

C: Rick Bean→National Zinc file, 063-00026 - 1
Altay Ertugrul, A&M Engineering and Environmental Services

Pace Analytical Services, Inc.
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ANALYTICAL RESULTS

Project: 602296
Project ID NATIONAL ZINC
The solid samples are reported on a dry weight basis.

Lab ID: 602296009 Date Collected 11/22/05 16:10 Matrix Solid
Sample ID: #9 Date Received 11/23/05 14:10

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	CAS No.	Qual	RegLmt
Metals											
6010 MET ICP			Preparation Method: EPA 3050								
			Analytical Method: EPA 6010								
Arsenic	1.6	mg/kg	1.1	1	11/29/05 00:00	SYW	11/30/05 14:33	TJG	7440-38-2		
Cadmium	ND	mg/kg	0.55	1	11/29/05 00:00	SYW	11/30/05 14:33	TJG	7440-43-9	2	
Chromium	5.3	mg/kg	0.55	1	11/29/05 00:00	SYW	11/30/05 14:33	TJG	7440-47-3		
Lead	6.8	mg/kg	0.55	1	11/29/05 00:00	SYW	11/30/05 14:33	TJG	7439-92-1		
Zinc	27.2	mg/kg	11.0	1	11/29/05 00:00	SYW	11/30/05 14:33	TJG	7440-66-6		
Wet Chemistry											
Percent Moisture			Analytical Method: ASTM D2974-87								
Percent Moisture	34.6	%	0.10	1			11/28/05 00:00	AJA			

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ANALYTICAL RESULTS QUALIFIERS

Project: 602296
Project ID: NATIONAL ZINC

PARAMETER QUALIFIERS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

ANALYTE QUALIFIERS

[1] Dilution perfomed due to matrix effects

[2] Dilution performed due to severe matrix effects

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QUALITY CONTROL DATA

Project: 602296
Project ID: NATIONAL ZINC

QC Batch: PMST/1129 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 602296001 602296002 602296003 602296004 602296005

METHOD BLANK: 18613

Associated Lab Samples: 602296001 602296002 602296003 602296004 602296005

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Percent Moisture	%	ND	0.10	

SAMPLE DUPLICATE: 18614

Parameter	Units	602226011 Result	DUP Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	20.8	21.5	3	20	

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QUALITY CONTROL DATA

Project: 602296
Project ID: NATIONAL ZINC

QC Batch: PMST/1130 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 602296006 602296007 602296008 602296009

METHOD BLANK: 18653
Associated Lab Samples: 602296006 602296007 602296008 602296009

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Percent Moisture	%	ND	0.10	

SAMPLE DUPLICATE: 18654

Parameter	Units	602296006 Result	DUP Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	19.6	22.2	13	20	

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nelac

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QUALITY CONTROL DATA

Project: 602296
Project ID: NATIONAL ZINC

QC Batch: MPRP/1291 — Analysis Method: EPA 6010
QC Batch Method: EPA 3050 — Analysis Description: 6010 MET
Associated Lab Samples: 602296001 602296002 602296003 602296004 602296005 602296006 602296007 602296008 602296009

METHOD BLANK: 18672

Associated Lab Samples: 602296001 602296002 602296003 602296004 602296005 602296006 602296007 602296008 602296009

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Arsenic	mg/kg	ND	1.0	
Cadmium	mg/kg	ND	0.50	
Chromium	mg/kg	ND	0.50	
Lead	mg/kg	ND	0.50	
Zinc	mg/kg	ND	10.0	

LABORATORY CONTROL SAMPLE: 18673

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	50	49.7	99	80-120	
Cadmium	mg/kg	50	52.6	105	80-120	
Chromium	mg/kg	50	54.0	108	80-120	
Lead	mg/kg	50	53.1	106	80-120	
Zinc	mg/kg	50	51.1	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 18674 18675

Parameter	Units	602296001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Arsenic	mg/kg	108	49.32	139	174	63	127	75-125	22	20	2,1
Cadmium	mg/kg	ND	49.32	53.2	54.6	108	105	75-125	3	20	
Chromium	mg/kg	38.9	49.32	93	94.9	110	108	75-125	2	20	
Lead	mg/kg	72.3	49.32	120	130	97	111	75-125	8	20	
Zinc	mg/kg	369	49.32	381	452	23	160	75-125	17	20	2

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QUALITY CONTROL DATA QUALIFIERS

Project: 602296
Project ID: NATIONAL ZINC

QUALITY CONTROL PARAMETER QUALIFIERS

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit

S - Surrogate

QUALITY CONTROL ANALYTE QUALIFIERS

[1] RPD value was outside of the control limits.

[2] The matrix spike recoveries are outside the control limits. Batch acceptance based on LCS recovery

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 602296
Project ID: NATIONAL ZINC

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
602296001	#1	ASTM D2974-87	PMST/1129		
602296002	#2	ASTM D2974-87	PMST/1129		
602296003	#3	ASTM D2974-87	PMST/1129		
602296004	#4	ASTM D2974-87	PMST/1129		
602296005	#5A	ASTM D2974-87	PMST/1129		
602296006	#6	ASTM D2974-87	PMST/1130		
602296007	#7	ASTM D2974-87	PMST/1130		
602296008	#8	ASTM D2974-87	PMST/1130		
602296009	#9	ASTM D2974-87	PMST/1130		
602296001	#1	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296002	#2	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296003	#3	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296004	#4	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296005	#5A	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296006	#6	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296007	#7	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296008	#8	EPA 3050	MPRP/1291	EPA 6010	ICP/1243
602296009	#9	EPA 3050	MPRP/1291	EPA 6010	ICP/1243

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Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of 906571.

Section A Required Client Information

Company: KDHE - BER
Address: 1009 SW Jackson Suite 410
Topeka, KS 66614
Email To: rbixby@kdhe.state.ks.us
Phone: 785-296-6437 Fax: 785-296-7030
Requested Due Date/TAT: 7-day TAT/12-6-05 *

Section B Required Project Information

Report To: Rob Bixby
Copy To:
Purchase Order No.:
Project Name: National Zinc
Project Number:

Section C Invoice Information

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ Other

SITE LOCATION ☐GA ☐IL ☐IN ☐MI ☐MN ☐NC ☐OH ☐SC ☐WI ☐OTHER

Section D Required Client Information

Valid Matrix Codes: MATRIX / CODE — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

ITEM #	SAMPLE ID (One Character per box (A-Z, 0-9 / ,) Samples IDs MUST BE UNIQUE)	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED Composite Start Date	Composite Start Time	Composite End/Grab Date	Composite End/Grab Time	Sample Temp at Collection	# of Containers	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analysis Test: Arsenic, Cadmium, Chromium, Lead, Zinc	Residual Chlorine (Y/N)	Pace Project Number / Lab I.D.
1	# 1	SL	G			11-22-05	11:50		1	X										001
2	# 2	SL	G			11-22-05	11:40		1	X										002
3	# 3	SL	G			11-22-05	13:15		1	X										003
4	# 4	SL	G			11-22-05	12:20		1	X										004
5	# 5 A	SL	G			11-22-05	13:35		1	X										005
6	# 6	SL	G			11-22-05	13:50		1	X										006
7	# 7	SL	G			11-22-05	14:10		1	X										007
8	# 8	SL	G			11-22-05	14:40		1	X										008
9	# 9	SL	G			11-22-05	16:10		1	X										009
10																				
11																				
12																				

Filtered (Y/N)
Requested Analysis

Pace Project Number / Lab I.D.: 602296

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITION
Rob Bixby	11-23-05	4:10	Pace	11/23/05	1110	4.0

Additional Comments:

* spoke with Angie Brown & have requested results by 12-6-05.

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Rob Bixby
SIGNATURE of SAMPLER: Rob Bixby
DATE Signed (MM/DD/YY): 11-23-05

Temp in °C | Received on Ice (Y/N) | Custody Seals Present (Y/N) | Samples Intact (Y/N)

SEE REVERSE SIDE FOR INSTRUCTIONS

ORIGINAL

ALL002Rev.3.31Mar05

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Green Country
TESTING

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Telephone 800.324.5757
Facsimile 918.828.7756

Altay Ertugrul
V & M Engineering
10010 E. 16th St.
Tulsa, OK 74128-4813
TEL: (918) 665-6574
FAX (918) 665-6576

November 30, 2005
Order No.: 105110313

RE: Cherryvale

Dear Altay Ertugrul:

Green Country Testing, Inc. received 8 samples on 11/23/2005 for the analyses presented in the following report.

In accordance with your instructions, Green Country Testing conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analysis was conducted using EPA approved methodologies. Test reports meet all the NELAC requirements. All relevant sampling information is on the attached chain-of-custody form. The initials SUB as the analyst designate any testing sub-contracted by Green Country Testing.

Certifications/Accreditation: OK - 7604
AR - ADEQ
KS - E-10232
LA - 4002

A scope of Certified/Accredited parameters is available upon request. If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Approved By: _____
Brian Duzan, Director
Environmental Services

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Green Country TESTING

Telephone 918.328.9977
Telephone 800.324.5757
Facsimile 918.828.7756

CLIENT: V & M Engineering
Lab Order: T05110313
Project: Cherryvale

Date Received: 11/23/2005
Date Reported: 30-Nov-05

Lab ID: T05110313-01 Collection Date: 11/22/2005 11:50:00 A Sample ID: #1

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	43.3	0.500	mg/Kg	11/29/2005	
Barium	109	0.250	mg/Kg	11/29/2005	
Cadmium	4.66	0.250	mg/Kg	11/29/2005	
Chromium	29.5	0.250	mg/Kg	11/29/2005	
Lead	33.0	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	141	0.250	mg/Kg	11/29/2005	

Lab ID: T05110313-02 Collection Date: 11/22/2005 11:40:00 A Sample ID: #2

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	116	0.500	mg/Kg	11/29/2005	
Barium	553	2.50	mg/Kg	11/29/2005	
Cadmium	4.78	0.250	mg/Kg	11/29/2005	
Chromium	29.9	0.250	mg/Kg	11/29/2005	
Lead	53.1	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	154	0.250	mg/Kg	11/29/2005	

Lab ID: T05110313-03 Collection Date: 11/22/2005 1:15:00 P Sample ID: #3

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	60.7	0.500	mg/Kg	11/29/2005	
Barium	337	2.50	mg/Kg	11/29/2005	
Cadmium	24.4	0.250	mg/Kg	11/29/2005	
Chromium	46.0	0.250	mg/Kg	11/29/2005	
Lead	118	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	2,320	2.50	mg/Kg	11/29/2005	

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CLIENT: A & M Engineering
Lab Order: T05110313 Date Received: 11-23-2005
Project: Cherryvale Date Reported: 30-Nov-05

Lab ID: T05110313-04 Collection Date: 11/22/2005 12:20:00 P Sample ID: #4

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	48.0	0.500	mg/Kg	11/29/2005	
Barium	159	0.250	mg/Kg	11/29/2005	
Cadmium	15.5	0.250	mg/Kg	11/29/2005	
Chromium	32.1	0.250	mg/Kg	11/29/2005	
Lead	102	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	968	2.50	mg/Kg	11/29/2005	

Lab ID: T05110313-05 Collection Date: 11/22/2005 1:35:00 P Sample ID: #5A

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	45.2	0.500	mg/Kg	11/29/2005	
Barium	213	0.250	mg/Kg	11/29/2005	
Cadmium	14.7	0.250	mg/Kg	11/29/2005	
Chromium	42.2	0.250	mg/Kg	11/29/2005	
Lead	65.2	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	1,170	2.50	mg/Kg	11/29/2005	

Lab ID: T05110313-06 Collection Date: 11/22/2005 1:50:00 P Sample ID: #6

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	44.4	0.500	mg/Kg	11/29/2005	
Barium	179	0.250	mg/Kg	11/29/2005	
Cadmium	7.44	0.250	mg/Kg	11/29/2005	
Chromium	30.7	0.250	mg/Kg	11/29/2005	
Lead	33.4	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	585	2.50	mg/Kg	11/29/2005	

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CLIENT: A & M Engineering
Lab Order: T05110313
Project: Cherryvale

Date Received: 11/23/2005
Date Reported: [illegible]

Lab ID: T05110313-07 Collection Date: 11/22/2005 2:10:00 P Sample ID: #7

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	32.7	0.500	mg/Kg	11/29/2005	
Barium	270	0.250	mg/Kg	11/29/2005	
Cadmium	4.72	0.250	mg/Kg	11/29/2005	
Chromium	36.7	0.250	mg/Kg	11/29/2005	
Lead	44.6	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	513	2.50	mg/Kg	11/29/2005	

Lab ID: T05110313-08 Collection Date: 11/22/2005 2:40:00 P Sample ID: #8

Matrix: SOIL

Analyses	Result	Detection Limit	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	SW6010A				KR
Arsenic	12.2	0.500	mg/Kg	11/29/2005	
Barium	74.4	0.250	mg/Kg	11/29/2005	
Cadmium	0.725	0.250	mg/Kg	11/29/2005	
Chromium	34.4	0.250	mg/Kg	11/29/2005	
Lead	3.23	0.125	mg/Kg	11/29/2005	
Selenium	< 0.500	0.500	mg/Kg	11/29/2005	
Zinc	39.3	0.250	mg/Kg	11/29/2005	

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CLIENT: A & M Engineering
Work Order: T05110313
Project: Cherryvale

QC SUMMARY REPORT

TestCode	Analyte	BatchID	QCType	Result	PQL	Units	%Rec	%RPD
TET_S_ICP	Arsenic	2876	MBLK	< 0.50	0.5	mg/Kg		
	Barium	2876	MBLK	< 0.25	0.25	mg/Kg		
	Cadmium	2876	MBLK	< 0.25	0.25	mg/Kg		
	Chromium	2876	MBLK	< 0.25	0.25	mg/Kg		
	Lead	2876	MBLK	< 0.12	0.125	mg/Kg		
	Selenium	2876	MBLK	< 0.50	0.5	mg/Kg		
	Zinc	2876	MBLK	< 0.25	0.25	mg/Kg		
	Arsenic	2876	LCS	48.15	0.5	mg/Kg	96.3	
	Barium	2876	LCS	50.6	0.25	mg/Kg	101	
	Cadmium	2876	LCS	49.45	0.25	mg/Kg	98.9	
	Chromium	2876	LCS	49.7	0.25	mg/Kg	99.4	
	Lead	2876	LCS	49.76	0.125	mg/Kg	99.5	
	Selenium	2876	LCS	47.41	0.5	mg/Kg	94.3	
	Zinc	2876	LCS	49.04	0.25	mg/Kg	98.1	
	Arsenic	2876	MS	47.48	0.5	mg/Kg	95	
	Barium	2876	MS	49.72	0.25	mg/Kg	99.4	
	Cadmium	2876	MS	50.24	0.25	mg/Kg	100	
	Chromium	2876	MS	49.58	0.25	mg/Kg	99.2	
	Lead	2876	MS	50.03	0.125	mg/Kg	100	
	Selenium	2876	MS	49	0.5	mg/Kg	98	
	Zinc	2876	MS	50.4	0.25	mg/Kg	101	
	Arsenic	2876	MSD	47.32	0.5	mg/Kg	94.6	0.337
	Barium	2876	MSD	49.39	0.25	mg/Kg	98.8	0.675
	Cadmium	2876	MSD	50.34	0.25	mg/Kg	101	0.195
	Chromium	2876	MSD	49.44	0.25	mg/Kg	98.9	0.269
	Lead	2876	MSD	49.85	0.125	mg/Kg	99.7	0.37
	Selenium	2876	MSD	48.61	0.5	mg/Kg	97.2	0.809
	Zinc	2876	MSD	50.35	0.25	mg/Kg	101	0.119

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A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

TULSA, OKLAHOMA

ENGINEERING ENVIRONMENTAL CONSTRUCTION

10010 E. 16th Street TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6576 E-Mail: amenlab@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A&M / KDHE	Altay Fat	665-6575

PROJECT NUMBER	PROJECT NAME
	Cherryvale

SAMPLERS (Signature): Jon Peck

ANALYTICAL TESTS REQUIRED

STA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	HCl	NO	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Zinc					REMARKS
	11/22/05	11:50	X		#1	Sol	1		X	X	X	X	X	X	X	X					Please dry
	11/22/05	11:40	X		#2	Sol	1		X	X	X	X	X	X	X	X					but do not
	11/22/05	12:15	X		#3	Sol	1		X	X	X	X	X	X	X	X					sieve
	11/22/05	12:20	X		#4	Sol	1		X	X	X	X	X	X	X	X					
	11/22/05	13:35	X		#5A	Sol	1		X	X	X	X	X	X	X	X					
	11/22/05	13:50	X		#6	Sol	1		X	X	X	X	X	X	X	X					Analytical
	11/22/05	14:10	X		#7	Sol	1		X	X	X	X	X	X	X	X					Method
	11/22/05	14:40	X		#8	Sol	1		X	X	X	X	X	X	X	X					6010B
																					(MEET FCP)

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)
				Jon Peck	11/23/05	12:30	[illegible]
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	REMARKS: Prep method 3050.			