REMOVAL ACTION PLAN

for

Former National Zinc Site,
Including Remediation of Portions of Drum Creek
and Unnamed Creek
Cherryvale, Montgomery County, Kansas

March 2007

Presented to:

Kansas Department of Health and Environment

BER SCANNED
FEB 06 2013

Prepared by
Salomon Smith Barney Holdings, Inc.
United States Steel Corporation
and
A & M Engineering and Environmental Services, Inc.

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BUREAU OF
ENVIRONMENTAL REMEDIATION

ENGINEER'S CERTIFICATION

I the undersigned, Altay M. Ertugrul, a Registered Professional Engineer in the State of Kansas, P.E. No. 10479. 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 Removal Action Plan for the Former National Zinc Site including Remediations of portions of Drum Creek and Unnamed Creek 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.

ALTAY M. ERTUGRUL
LICENSED
03/14/07
NO. 10479
KANSAS
PROFESSIONAL ENGINEER

Altay M. Ertugrul

Altay M. Ertugrul, P.E. (Kansas P.E. No. 10479)
President

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1.0 INTRODUCTION

This Removal Action (RA) plan is prepared by U.S. Steel Corporation and Salomon Smith Barney Holdings Inc. (The Respondents) in compliance with the Consent Order in Kansas Department of Health and Environment (KDHE) Case Number 03-E-0022 (the Consent Order). This RA plan is prepared in conformity with the findings of the Removal Action Design Report (the RAD Report), for the former National Zinc Site (the Site)*, and the Supplement to the Remedial Action Design Report for Drum Creek Remediation, including Unnamed Creek between the Confluence with Drum Creek and the Martin Street Crossing (the Supplement). The RAD Report was submitted to KDHE in July 2004 and the Supplement was submitted to KDHE in April 2006. The Supplement was later revised and re-submitted in June, 2006 and July, 2006.

The RAD Report was approved by KDHE by letter dated September 13, 2004 (Approval Letter) subject to four considerations listed in the same letter. In a letter dated October 20, 2004 Respondents addressed the considerations listed in the Approval Letter. During the public meeting on December 14, 2004 held in Cherryvale, Kansas, KDHE presented the project to the public and obtained their comments. Following the December 14 2004 public meeting, KDHE supplemented the Approval Letter by its letter dated April 27, 2005. Copies of the letters referenced in this paragraph are included in Appendix A.

In September 2004, after completing 8 months of groundwater monitoring, Respondents prepared and submitted to KDHE an Addendum to the December 2003 Hydrogeological Investigation Report. In a letter dated November 2004, KDHE approved the amended Hydrogeological Investigation Report, including the Addendum, and acknowledged that this amended Report was incorporated into the Consent Order as part of the RAD Report. KDHE's letter of November 2004, is also attached as part of Appendix A.

In the RAD Report, one of Respondents' recommendations was removal of visible sediments from Unnamed Creek between the west boundary of the smelter Site and Highway 169, but Respondents recommended no action regarding the rest of Unnamed Creek and Drum Creek. One of the conditions included in the 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.

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*The term "Site" as used in this RA Plan covers the former smelter site only, and does not include the portions of Drum Creek and Unnamed Creek that are also the subject of remediation.

In the Supplement, Respondents requested that KDHE approve amending the RAD Report to (1) present 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) 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.

One of the Respondents' recommendations in the Supplement was the construction of a Sediment Catchment approximately 4.75 miles downstream from the Confluence of Drum Creek and Unnamed Creek. Prior to submittal of the Supplement, Respondents by 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 preliminary review and approval. KDHE responded to the Respondents' letter of February 6, 2006 with a letter dated March 21, 2006. (See Appendix A). In its letter, KDHE stated that it officially approved the Design Basis Memorandum, providing that the Respondents provide additional information on five comments listed in that letter. The Respondents in the Supplement provided additional information and a response to the five comments listed in KDHE's March 21, 2006 letter. Additionally, the Supplement was updated and revised to include information and materials responsive to comments contained in KDHE's letter of June 9, 2006. KDHE approved the Respondents' responses to KDHE's comments in letter dated June 29, 2006.

On April 18, 2006, Respondents submitted to the U.S. Army Corps of Engineers, Eldorado, Kansas District, and a Section 404 Permit Application for the sediment removal activities in Unnamed Creek and Drum Creek and construction of the sediment Catchment structure in Drum Creek.

Currently the RAD Report and Supplement are under review by KDHE. The Section 404 Permit Application was approved by the U.S. Army Corps of Engineers, Eldorado District on May 23, 2006. The State of Kansas Department of Agriculture issued a permit on September 29, 2006 to construct the Sediment Catchment structure as authorized under KSA 82a-301. A final revised action decision from KDHE is anticipated sometime after January 15, 2007.

The purpose of this RA plan is to develop and present to KDHE a plan for the implementation of the approved removal action set forth in the RAD Report and the Supplement.

2.0 EXTENT OF CONTAMINATION

The media of concern identified and evaluated in the RAD Report and the Supplement are:

1. On-Site soil contamination

2. Sediment Contamination in portions of Unnamed Creek and Drum Creek

3. Eroded cap and poor drainage over the former lagoon area

4. Potential off-Site ground water contamination

Following a Hydrogeological Investigation it was concluded that there is no off-Site ground water contamination. Semi annual monitoring of the off-Site ground water to verify the findings of the Hydrogeological Investigation Report is completed. The results confirmed the conclusion of the Hydrogeological Investigation Report that there is no off-Site groundwater contamination. Therefore, no further consideration of off-Site groundwater is included in this RA Plan.

2.1 Contaminants of Concern

2.1.1 On-Site Soils

The contaminants of concern identified in the RAD Report for soils are arsenic, cadmium and lead.

2.1.2 Off-Site Sediments

The Respondents collected surface water and sediment samples in Unnamed and Drum Creeks to determine contamination levels and developed a correlation between sediment and surface water pathways. Based on this analysis, and previously collected data, the RAD Report and its Supplement identified and listed cadmium, arsenic, lead and zinc as contaminants of concern, primarily in the sediments. The RAD Report concluded that the heavy metal contaminants are immobile in the sediments and have very little impact on the surface waters.

2.2 Clean Up Levels

2.2.1 On-Site Soils

Clean up levels for the on-Site soils are the Kansas Non-Residential Risk (NRRSK) levels, (lead 1000mg/kg., cadmium 1000 mg/kg., arsenic 28 mg/kg.).

2.2.2 Off-Site Visible Sediments – Unnamed Creek

All visible sediments in Unnamed Creek will be removed from the Site to the Confluence with Drum Creek (the Confluence), and taken to the on-Site disposal facility for disposal.

2.2.3 Off-Site Visible Sediments – Drum Creek

All visible sediments in Drum Creek will be removed from the Confluence to a point approximately 300 feet downstream of the Confluence. The removed sediments will be taken to on-Site disposal facility for disposal.

3.0 SELECTED REMOVAL ACTION AT THE SITE

3.1 Removal Action Goals

The Removal Action Goal for soil material on-Site exceeding the NRRSK is to prevent any future harm to the public and the environment by either removing the soils or capping them in place. The Goal of repairing the cap over the previously closed pond area and raising it a minimum of three feet is to prevent the erosion of the fill material below the cap, limit the percolation of the surface water, and prevent interfacing between the groundwater and surface water.

3.2 Soil Removal

The impacted soil removal from the Site will be based on the following steps:

Soils from the areas on the Site (outside the EPA Repository and outside the active rail line corridor and excluding the portion of Zone 6 between the EPA Repository and the active rail line corridor) containing contaminants of concern in concentrations above the Kansas NRRSK levels, will be removed and the excavated soils will be consolidated on the former lagoon area on the west side of the Site.

The locations where soil removal will be required were identified in the surface and subsurface sampling conducted after the RAD Report was submitted. The results of this sampling are set forth in a Soil Sampling Report dated April, 2005 and submitted to KDHE on April 7, 2005. The surface and subsurface soil sampling locations are shown in Figure 1. The surface sampling results are summarized in Table 1, and the subsurface sampling results are summarized in Tables 2 through 5.

Based on the above described soil sampling program, Impacted Soils at the Site have been determined to be located in seven Zones, the boundaries of which are shown in Figure 2. The approximate amount of acreage within each of these Zones, plus the estimated volume and depth of Impacted Soils is described below.

Zone 1 Zone 1 is located at the southeast and central portion of the Site. Total area of Zone 1 is approximately 9.0 acres. The depth of the impacted soil in this zone is approximately 4.5 feet and the volume is estimated to be 64,000 cu. yd.

Zone 2 Zone 2 is located at the entrance to the EPA repository area; the impacted soil in this zone is located on approximately 0.5 acres at the EPA repository area, and is estimated to be approximately 400 cu.yd.

Zone 3 Zone 3 is located in the middle portion of the Site and west of the railroad, and is approximately 7.5 acres. The average depth of the impacted soil material is 5.0 feet and the estimated volume is 61,000 cu. yd.

Zone 4 Zone 4 represents four small areas, two located east of the railroad and two located in the northwest portion of the Site. Total of the areas in zone 4 is approximately 2.0 acre. The impacted soil material in each zone is approximately 3.5 feet deep. It is estimated that the total impacted soil in this zone is 12,000 cu. yd.

Zone 5 Zone 5 represents the area within the surface contamination boundary and excludes the areas covered under Zones 1 through 4 and 6 (approximately 40 acres). The top 6" layer in this zone will be excavated. Although the results shown in Table 2 indicate that no deeper excavations will be required, confirmation samples will be collected in accordance with the draft RAD Report. It is estimated that approximately 48,400 cu. yd. of impacted soil material exists in this zone.

Zone 6 Zone 6 is made up of two locations at which the estimated depth of impacted soil is 8 feet. These two locations at the Site classified in Zone 6 are:

1. The area north east of the EPA Repository between the EPA Repository and the railroad right-of-way, which is approximately 1.0 acre, containing approximately 13,000 cu. yd. of impacted soil material. This area will not be excavated but will be capped with 18 inches of clay and 6 inches of vegetative soil and left in place.

2. Located at the south edge of Zone 1 but within the boundary of Zone 1 is an area containing approximately 5,000 cu. yd. of impacted soil material.

Zone 7 Zone 7 is made up of the drainage ditch on the north side of Martin Street, which is approximately 1.7 acres and will require approximately 2,200 cu. yd. of removal. The top 6-inch layer in Zone 7 will be sampled to determine the impacted material that requires removal.

All Impacted Soils described in Figure 2 and in the seven Zones set forth above shall be removed, subject to the following:

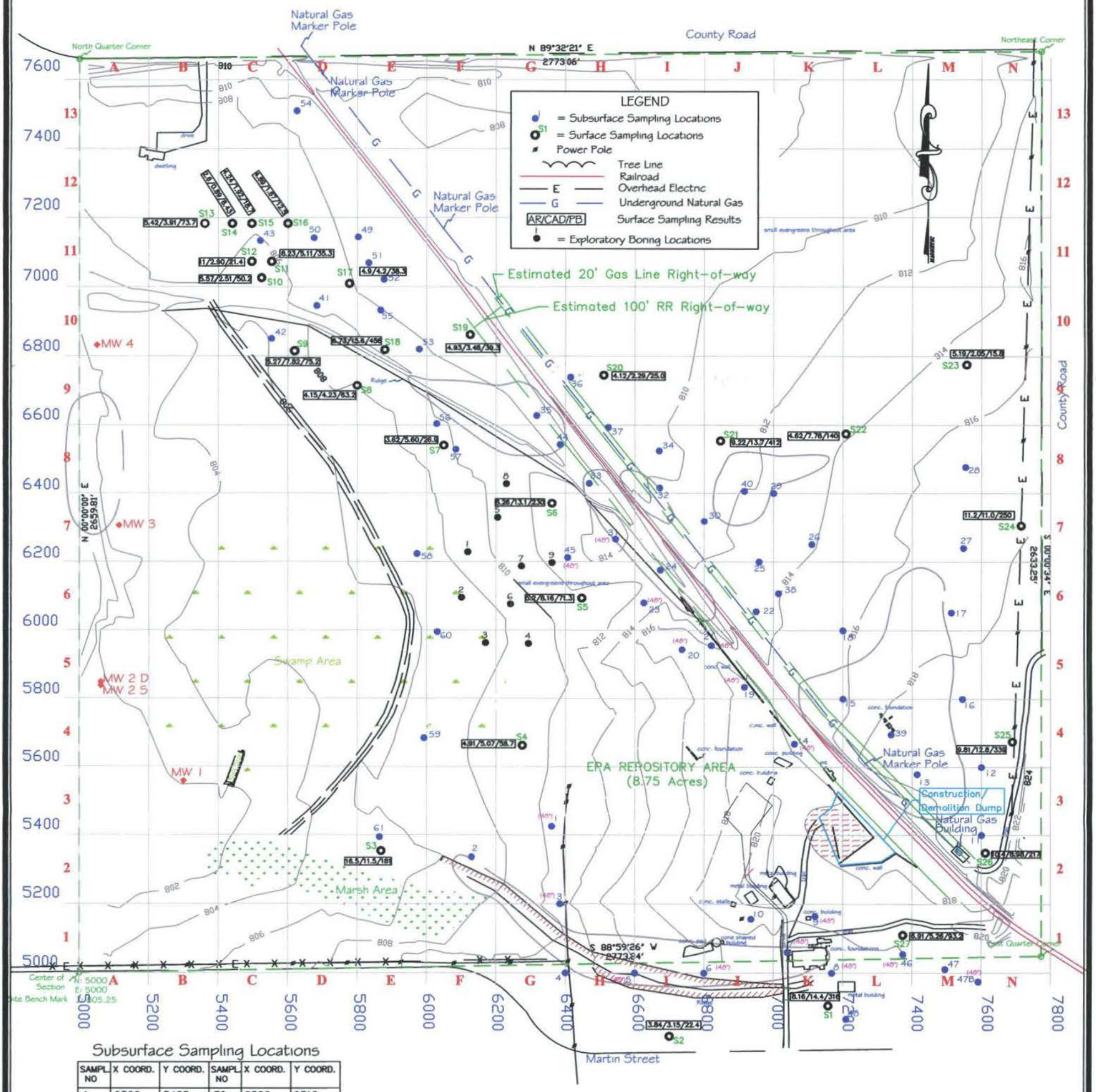
1. The Impacted Soils located in the area described in paragraph 1 of Zone 6 will not be removed, due to the sliver-like shape of this tract and its location between the east boundary of the EPA repository area and the west boundary of the railroad right-of-way. This tract will instead be subjected to deed restrictions.

2. The Impacted Soils located in the area described in paragraph 2 of Zone 6 and in all of the other six Zones, will be removed to the depths specified in each Zone, subject to the following limitations: (a) as to Zones 1 through 4 and paragraph 2 of Zone 6, if confirmation sampling indicates that impacted soils continue to be found in particular isolated areas at the specified depth, a decision will be made in the field to determine whether to continue excavating to a lower depth, or to

subject the isolated areas in question to deed restrictions; (b) as to Zones 5 and 7, if confirmation sampling indicates that impacted soils continue to be found in particular isolated areas at the specified depth, excavation will continue until impacted soils are no longer found, except that at a depth of 18 inches, a decision will be made in the field to determine whether to continue excavating to a lower depth, or to subject the isolated areas in question to deed restrictions.

It is estimated that the impacted soils to be removed from the Site and placed in the on-Site disposal area will be approximately 193,000 cu. yd.

The excavated impacted soils will be placed in the on-Site disposal area, which will be located on top of the former Lagoon area covering approximately 24 acres. The impacted soil will be placed with 12 inch lifts and compacted to 90% Proctor. A cap system containing 12 inches of clay liner and 6 inches of vegetative soil will be placed over the on-Site disposal area. The surface of the cap will be vegetated according to the Vegetative Plan presented in Appendix C. The excavated areas from which impacted soil is removed will be graded with clean soil brought from off site, and will contain a minimum of 6 inches of clean soil topped with proper vegetation as listed in Section 4. The fill material will be placed with 6 inch lifts and compacted to 90% Proctor.



Subsurface Sampling Locations

SAMPL NO	X COORD.	Y COORD.	SAMPL NO	X COORD.	Y COORD.
1	6360	5425	30	6800	6318
2	6130	5336	31	6582	6293
3	6384	5200	32	6672	6415
4	6400	5000	33	6468	6429
5	6600	5000	34	6670	6525
6	6800	5000	35	6317	6627
7	7040	5060	36	6415	6738
8	7168	5000	37	6523	6593
9	7120	5164	38	7014	6108
10	6935	5156	39	7339	5695
11	7600	5400	40	6916	6406
12	7600	5600	41	5683	6946
13	7414	5579	42	5553	6851
14	7060	5668	43	5520	7133
15	7200	5800			
16	7545	5800	49	5802	7144
17	7513	6052	50	5675	7141.5
18	7200	6000	51	5832.5	7068.5
19	6916	5835	52	5876.5	7021.5
20	6736	5944	53	5978.5	6820
21	6821	5956	54	5626	7510
22	6950	6055	55	5867	6933
23	6626	6080	56	6029	6604
24	6674	6176	57	6084	6529
25	6958	6200	58	5972	6223
26	7110	6257	59	5992	5684
27	7548	6240	60	6031	5995
28	7554	6478	61	5864	5394
29	7000	6400			

Surface Sampling Locations

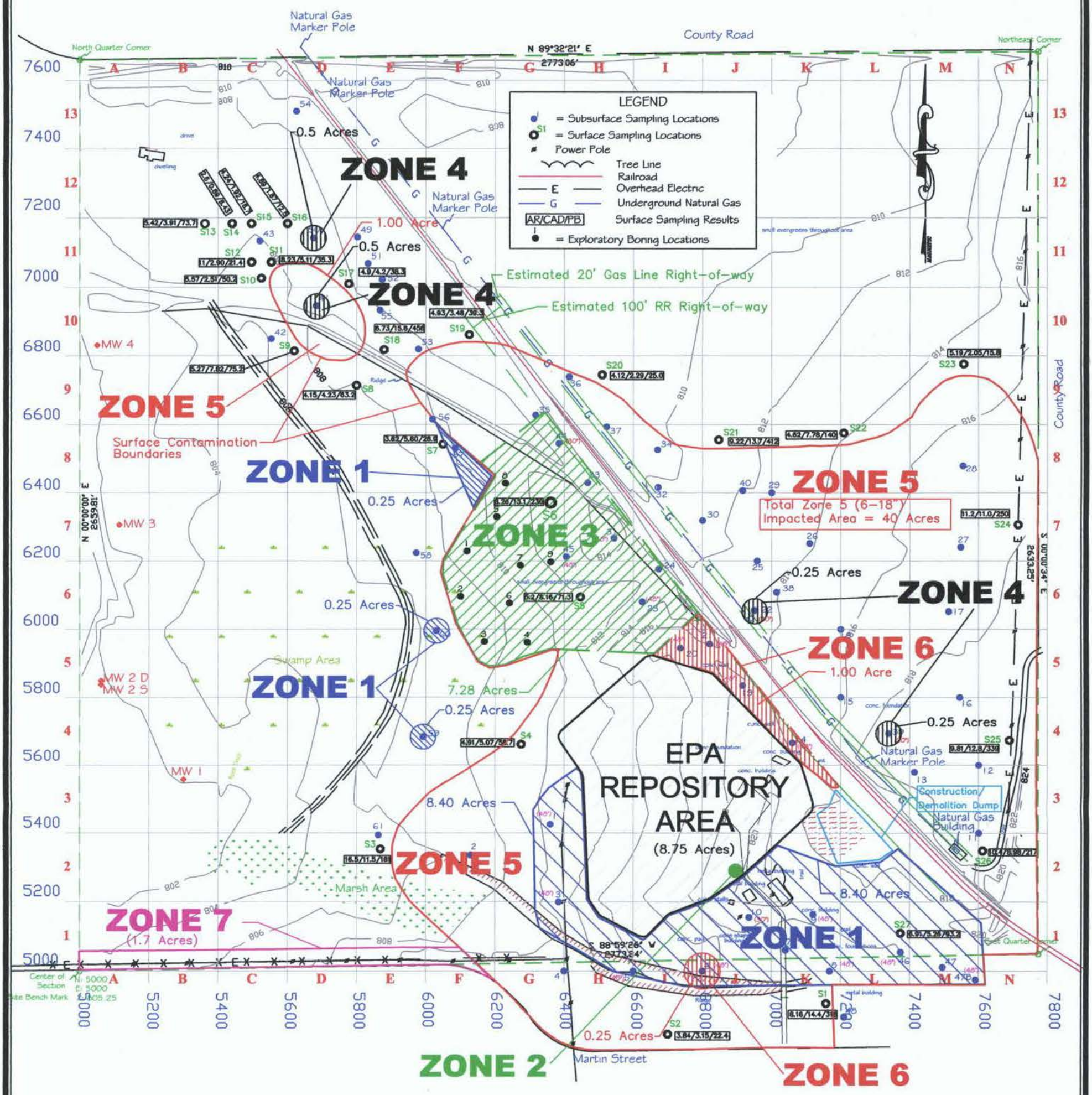
SAMPL NO	X COORD.	Y COORD.	SAMPL NO	X COORD.	Y COORD.
S1	7157.76	4905.17	S15	5496.00	7184.00
S2	6699.99	4817.32	S16	5600.00	7184.00
S3	5868.47	5354.04	S17	5776.79	7010.05
S4	6275.46	5662.77	S18	5879.14	6818.70
S5	6446.93	6094.09	S19	6125.50	6862.50
S6	6360.86	6370.54	S20	6510.13	6744.79
S7	6049.29	6541.22	S21	6846.80	6554.96
S8	5799.45	6714.98	S22	7208.71	6575.53
S9	5619.29	6815.24	S23	7557.11	6776.67
S10	5524.11	7026.59	S24	7714.70	6305.78
S11	5553.00	7073.00	S25	7689.70	5674.78
S12	5496.00	7073.00	S26	7611.50	5349.00
S13	5361.00	7184.00	S27	7373.45	5109.96
S14	5440.00	7184.00			

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

SOIL SAMPLING LOCATIONS FOR
FORMER NATIONAL ZINC SITE, CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
1" = 300'	4-26-2006	1
APPROVED BY: AME	DRAWN BY: OME	PROJECT NO. 1804-003



NOTE:
Zone 7 covers an area of approximately 50 ft. wide land along the north side of the Country Road.

ZONING LEGEND

- = Surface Contamination Boundary
- = Zone 1 - Estimated Impacted Soil Depth 4.5 ft.
- = Zone 2 - Located at Southeast Entrance to the EPA Repository Area
- = Zone 3 - Estimated Impacted Soil Depth 5 ft.
- = Zone 4 - Estimated Impacted Soil Depth 3.5 ft.
- = Zone 5 - Estimated Impacted Soil Depth 6 to 18 Inches.
- = Zone 6 - Estimated Impacted Soil Depth 8 ft.
- = Zone 7 - Estimated Impacted Soil Depth 0 to 12 Inches.

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

IMPACTED SOIL ZONES FOR
FORMER NATIONAL ZINC SITE, CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
1" = 300'	4-26-2006	2
APPROVED BY: AME	DRAWN BY: OME	PROJECT NO. 1804-003

TABLE 1

Surface Soil Sample Results
at 0"-6" depth

Perimeter Boundary Sampling Results mg/Kg				Dry Sample Results mg/Kg		
Sample #	Arsenic	Cadmium	Lead	Arsenic	Cadmium	Lead
S1	8.16	14.4	316	8.92	21.7	433
S2	3.84	3.15	22.4			
S3	16.5	11.5	181			
S4	4.91	5.07	58.7			
S5	5.2	8.16	71.3			
S6	8.26	13.1	230			
S7	3.62	5.6	26.9			
S19	4.93	3.48	39.3			
S20	4.12	2.29	25			
S21	9.22	13.7	412	7.23	14.8	572
S22	4.62	7.78	140			
S23	5.19	2.05	15.8			
S24	11.2	11	250			
S25	9.81	12.8	339	54.1	29.5	914
S26	10.4	8.98	217			
S27	6.91	5.26	93.2			
Northwest Quadrant Sampling Results mg/Kg				Dry Sample Results mg/Kg		
Sample #	Arsenic	Cadmium	Lead	Arsenic	Cadmium	Lead
S8	4.15	4.23	63.2			
S9	5.27	7.82	75.2			
S10	5.57	2.51	80.2			
S11	8.23	5.11	35.3			
S12	11	2.9	21.4			
S13	5.42	3.91	73.7			
S14	2.6	0.89	8.43			
S15	4.24	1.92	18.7			
S16	4.89	1.87	12.5			
S17	4.9	4.2	38.3			
S18	6.73	15.6	456			

TABLE 2

Subsurface Soil Sample Results
at 6"-18" depth

Zone # 1 Sub-Surface Sampling Results mg/Kg			
Sample #	Arsenic	Cadmium	Lead
1	46.4	35.4	<0.125
2	9.47	17.6	66.3
3	19.9	49.7	404
4	17.6	13.5	66.4
5	33.9	113	1,620
6	188	196	36,000
7	177	345	3,810
8	54.2	1,080	20,800
9	12.1	41.3	543
10	62.1	224	12,300
11	8.76	3.74	42.6
12	6.14	18.1	61.2
13	9.73	12.7	146
14	8.11	12.7	272
15	6.44	4.16	36.1
16	5.38	5.41	29
17	4.93	9.89	24.4
18	5.36	8.46	64.2
19	29.7	231	3,380
20	8.37	22	95.4
21	11.7	43.6	1,820
22	23.5	33	1,000
23	8.62	57.4	293
24	6.31	19.4	129
25	5.46	1.62	16.5
26	5.64	9.7	20.1
27	9.52	4.32	50.4
28	9.65	8.33	63.4
29	4.77	5.01	31.6
30	4.75	3.26	18.2
31	61.2	63.6	1,290
32	NA	NA	NA
33	7	14.1	98.6
34	14.4	12.3	104
35	10.9	28.5	827
36	4.6	5.7	24.2
37	NA	NA	NA
38	8.18	20.1	262
39	95.4	126	3,020
40	7.49	2.8	27.4
41	12.4	5.48	68.5
42	20.1	9.47	29.3
43	6.96	1.93	37.1
44	22.6	47.6	1,240
45	83.7	61.3	2,690

TABLE 2 (Continued)

46	9.86	5.46	52.9
47	NA	NA	NA
47B	38.1	15.8	529
48	9.65	4.24	48.9
49	9.97	3.97	43.2
50	101	3.07	234
51	<0.5	2.1	24.6
52	<0.5	9.34	78.2
53	<0.5	11.9	29.7
54	<0.5	4.05	11.7
55	0.87	5.68	20.3
56	9.17	320	883
57	44.5	78.8	467
58	37	12.1	120
59	1.62	12	17
60	50.7	42.9	713
61	4.87	17.6	34.8

TABLE 3

Subsurface Soil Sample Results
at 18"-30" depth

Zone # 2 Sub-Surface Sampling Results mg/Kg			
Sample #	Arsenic	Cadmium	Lead
1	79.8	132	3,000
2	10.4	6.92	69.8
3	51.2	222	3,540
4	9.76	3.34	80.3
5	12.2	66.7	96
6	261	171	36,100
7	20.1	301	1,360
8	106	646	12,600
9	16.4	338	1,030
10	18.8	11.1	116
11	6.67	2.68	29.4
12	5.64	1.44	12.7
13	5.72	0.593	15.7
14	22.4	196	18,000
15	5.29	1.68	14.2
16	4.88	1.89	15.5
17	6.92	2.51	37.6
18	4.79	3.85	56.2
19	72.9	655	12,600
20	122	144	3,860
21	23.8	224	7,920
22	6.28	1.8	21.5
23	19.4	239	1,400
24	5.59	1.53	20.9
25	4.29	1.53	14.5
26	5.81	1.7	13.4
27	7.7	1.43	53.4
28	10	1.31	36.6
29	7.15	3.51	30.5
30	4.26	1.74	15.2
31	41.5	117	3,780
32	NA	NA	NA
33	7.08	2.61	20.8
34	6.3	2.94	25.4
35	4.57	5.01	19.6
36	4	1.2	13.6
37	NA	NA	NA
38	9.64	12	237
39	4.47	30.2	47.5
40	4.79	1.54	14
41	239	2.79	278
42	6.67	1.97	31.3
43	8.95	2.9	31.1
44	6.5	24.6	73.9
45	206	103	4,600

TABLE 3 (Continued)

46	103	784	14,600
47	NA	NA	NA
47B	19	9.59	1,850
48	10.1	3.76	182
49	15.7	1.95	62.4
50	3.27	2.33	83.6
51	3.91	1.61	6.47
52	1.96	3	45.6
53	<0.5	2.83	23.5
54	1.71	2.33	13.6
55	2.22	2.32	19.3
56	12.9	42.2	195
57	81.8	263	3,520
58	25.8	52.8	42.2
59	473	178	104
60	450	111	1,620
61	2.9	14.1	17.8

TABLE 4

Subsurface Soil Sample Results
at 30"-72" depth

Zone # 3 Sub-Surface Sampling Results mg/Kg			
Sample #	Arsenic	Cadmium	Lead
1	598	84.7	1,920
3	<5.0	83.8	46
7	52.5	151	1,240
6	415	125	7,570
8	19	273	2,230
9	1.51	70.1	65
10	2.32	7.63	820
14	14.2	84.2	1,520
19	19.4	1,060	1,450
20	11.1	204	2,630
21	98.85	274	8,115
23	53.9	19.7	242
41	36.3	7.57	40
43	70.2	1.85	39
45	61.2	10.1	214
46	4.4	23.6	496
49	21.1	2.69	158
50	<0.5	1.68	14.85
51	<0.5	2.58	16.5
52	<0.5	4.91	24.9
53	2.37	2.56	22.4
54	1.24	2.8	19.1
55	0.861	2.57	17.1
57	6.97	145	240
61	7.4	13.2	21.5

TABLE 5

Subsurface Soil Sample Results
at 72" - 90" depth

Zone # 4 Sub-Surface Sampling Results mg/Kg			
Sample #	Arsenic	Cadmium	Lead
6	62	118	1,350
7	6.4	5.08	38
14	<0.500	148	2,270
19	2.11	388	7,420
20	0.716	106	40.1

3.3 Removal Action Plan at the Site

The following presents the RA Plan for Site Remediation in tasks and the description of the work effort for each task.

Task 1: Develop and Submit the RA Plan to KDHE

a.) Upon finalizing the draft RA Plan, it will be submitted to KDHE for review, comment, modification and approval.

b.) Negotiate with KDHE concerning the Implementation of RA Plan.

c.) Obtain Permits and Complete Access Agreements.

All necessary permits and access arrangements with property owners will be obtained prior to start of construction.

There are no permit requirements for the borrow area excavation activities A land reclamation plan will be developed for the borrow area which will comply with good engineering practices.

Task 2. Prepare, Send Bid Packages to Bidders and Obtain Bids

Task 3. Contract Award

Task 4. Mobilization

Task 5. Flag the Grid System and Excavation Zones

The grid system shown in Figure 1 and the Impacted Soil Boundaries and Zones shown in Figure 2 will be surveyed and flagged prior to start up of the Removal Action construction.

Task 6. Construct Entrance Areas and Service Roads

The entrance areas and service roads to be constructed are shown in Figure 3, which indicate the entrance areas and the service road system to be utilized during construction activities. There are four entrances to be used for entering and leaving the Site. For most trucking and heavy equipment activities the entrances on the north side and east side will be used. There are two entrances at the south side of the Site. South entrance #1 is located in the southeast half and south entrance # 2 is located off Martin Street towards the southwest corner of the Site. The service road system to be utilized during construction activities and its construction specifications are shown in Figure 3.

Task 7. **Prepare On-Site Disposal Area**

The surface of the former Lagoon area will be graded and prepared to support construction equipment prior to placement of the impacted soil. Where necessary dry soil will be placed and compacted for preparing the subbase to support construction equipment.

Task 8. **Prepare Borrow Area for Operation**

The surface of the borrow area will be cleared from trees and other vegetation. Any necessary access roads at the borrow pit will be constructed prior to start up of excavation and transportation of clean soil and clay material to the site. There are no permit requirements for operations of the borrow area, although during operations the operator is required to comply with best engineering practices.

Task 9. **Start Excavation of Soils above the NRRSK from the Site**

Prior to starting excavation of impacted soil, all of the Zones shown in Figures 2 will be cleared of trees, other vegetation and debris, with the exception of buildings, foundations, large concrete debris and large trees. Zones 1, 2, 3, 4, and 6 (paragraph 2 only) will be excavated to their designated depths listed in Figure 2 prior to confirmation sampling. The top 6-inch layer in Zone 7 will be sampled to determine the impacted soils for removal. The surface of the excavated areas will be sampled to determine if additional excavation will be required. In Zone 5, the top 6 inches will be excavated and transported to the on site disposal area, then the surface of the excavated area will be sampled to determine if a second 6 inch layer excavation will be required. This process will be repeated until a depth of 18 inch is reached.

Following sampling of the surface of the excavated areas in each Zone where warranted, the Respondents will determine if the excavation will continue to deeper depths or if a Deed Restriction should be in place.

The Respondents' objective is to excavate all of the impacted soils and keep to a minimum the areas subject to Deed Restrictions.

The sampling procedures to be used for sampling the surface of the excavated areas are described in Appendix B.

Task 10. **Transport and Place Contaminated Soils in the On-Site Disposal Area**

The excavated contaminated soils will be transported to the former lagoon area for on-Site disposal. The contaminated soils will be placed in the on-Site disposal area with 12-inch lifts and compacted.

Task 11. **Construct Sediment Catchment System**

The sediment Catchment system will be constructed in compliance with the engineering design provided in Section 4.

Task 12. **Excavate the visible sediments from the Unnamed Creek, transport and place in on-Site Disposal Area**

Details on this task are provided in Section 4 of this Plan.

It is anticipated that approximately 2,000 cu. yd. of visible sediments will be excavated from the Unnamed Creek and transported to the on-Site disposal area. It is likely that 2000 cu. yd. of clean soil will be needed to grade the excavated areas within the Unnamed Creek pathway, to minimize pooling and promote proper drainage.

Task 13. **Excavate Visible Sediments from Drum Creek – Transport and Place in On-Site Disposal Area**

Details on this task are provided in Section 4 of this Plan. It is estimated that approximately 2,200 cu. yd. of visible sediments will be removed from Drum Creek.

Task 14. **Place Clean Fill Material in Excavated Areas at the Site and Grade the Site for Drainage**

The RAD requires that following excavation of the impacted soils in each Zone, a minimum of 6 inches of clean soil be placed on the surface of the excavated areas. Most of the excavated areas will require the placement of clean fill material, in order to construct a good surface drainage system at the Site. The surface will be graded and vegetated. The fill material to be placed in the excavated areas will be in 12 inch lifts and compacted to 90% Proctor.

Task 15. **Construct Cap System for On-Site Disposal Site**

The clay cap system to be constructed over the on-Site disposal site will include 12 inches of clay liner, 6 inches of vegetative soil and an effective vegetative cover on the surface. It is also required that the combined thickness of the impacted soil and sediment placed on the former lagoon area plus the thickness of the clay cap and vegetative soil, must raise the surface of the entire Lagoon area by a minimum of three feet.

The on-Site disposal facility will be constructed in accordance with the Engineering Design Drawings, Engineering Specifications, Construction Quality Assurance Plan (CQA) as well as the Vegetation Plan presented in Section 5.

Task 16. Vegetate the Disposal Area and the Disturbed Areas at the Site

The surface of the clay cap over the on-Site disposal site and the surface of the excavated areas, after the final grading, will be vegetated in accordance with the revegetation plans presented in Section 5.

Task 17. Survey and Fence the Restrictive Covenant (Deed Restrictions) Areas

Currently there are Restrictive Covenants imposed by KDHE for the entire Site. One of the purposes of the Remedial Action is to remove as much of the Site from the Restrictive Covenants as is possible and practicable, and to enable the city of Cherryvale to use the areas released from the Restrictive Covenant for industrial development. The areas that will remain under the Restrictive Covenants are under two categories:

1. The four specific areas listed below:

a.) The Former Lagoon area, approximately 24 acres, which will be used for on-Site disposal, capped, fenced and also will require post closure maintenance and care.

b.) The EPA Repository area, approximately 8.75 acres, which was previously capped by EPA; will be compacted to the extent feasible from the surface, but will not be fenced; it will be available to the City for appropriate use.

c.) An area of approximately 1.0 acre, which is classified as Paragraph 1 of Zone 6, located at the north east of the EPA Repository and bordering the railroad right of way, will be capped with 18 inches of clay liner, 6 inches of topsoil and fenced.

d.) The city of Cherryvale Construction/Demolition Dump Site which was previously closed under the KDHE rules; it will not be fenced and will not be useable.

2. Any additional areas that may be designated during the RA Construction will be capped with 18 inches clay liner, topped with 6 inches topsoil, vegetative cover and fenced.

The areas remaining under the Restrictive Covenants will be surveyed, and the legal descriptions will be developed and recorded in the Montgomery County land records in order to comply with KDHE requirements.

Task 18. Implement Land Reclamation Plan at Borrow Area

A Land Reclamation Plan for the Borrow Area operations will be developed and implemented upon the completion of the project.

Task 19. Demobilization

Upon completion of the construction activities, all equipment including trailers will be demobilized. The site will be then cleaned and graded.

Task 20. Prepare As-Built Drawing and Certification Document

Upon completion of all the construction activities, a Certification Document will be prepared which will include a complete list of all the construction activities performed. The data and information will be gathered in conjunction with Quality Control, Quality Assurance, As Built Drawing and Engineers Certification of completion of work in compliance with the approved RA Plan. It is anticipated that the contractor will have the site flown and mapped for preparing the As Built Engineering Drawings.

The Engineering Certification Document will also include a finalized Post Closure Care and Maintenance Plan.

Task 21. Complete Regulatory Procedures for Restrictive Covenant Areas

The survey and legal description of the Restrictive Covenants will be submitted to KDHE with proof of recording in the County land records as a prerequisite to Certification of Completion/Closure by KDHE procedure.

4.0 SELECTED REMOVAL ACTION IN PORTIONS OF UNNAMED CREEK AND DRUM CREEK

4.1 Removal Action Goals

The Removal Action Goal for visible Sediments containing heavy metal impacts is to implement sediment removal and containment alternatives which will abate, prevent, minimize, or eliminate the environmental impacts associated with heavy metal contamination contained in sediments to local and downstream receptors.

4.2 Summary of Creek Remediation

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 the remediation of Drum Creek and Unnamed Creek. Following this review the Respondents have identified and presented in the Supplement the following as the most applicable and beneficial remedial alternative:

1. Construct sediment Catchment Dike system on Drum Creek approximately 4.75 miles downstream of the Confluence to capture sediments and prevent their movement downstream.

2. Remove all of the visible sediments in Unnamed Creek between the Site and Martin Street Crossing to the EPA Borrow Area (Martin Street Crossing).

3. Remove all of the visible sediments in Unnamed Creek between the Martin Street Crossing and the Confluence.

4. Install a temporary flow control dike below the City Outfall and above the Confluence for de-watering purposes.

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

6. Remove the temporary flow control dike and restore the flow in Drum Creek.

7. Dispose all visible sediments removed from Drum Creek and Unnamed Creek at the Disposal Area to be constructed on the old lagoon area at the Site.

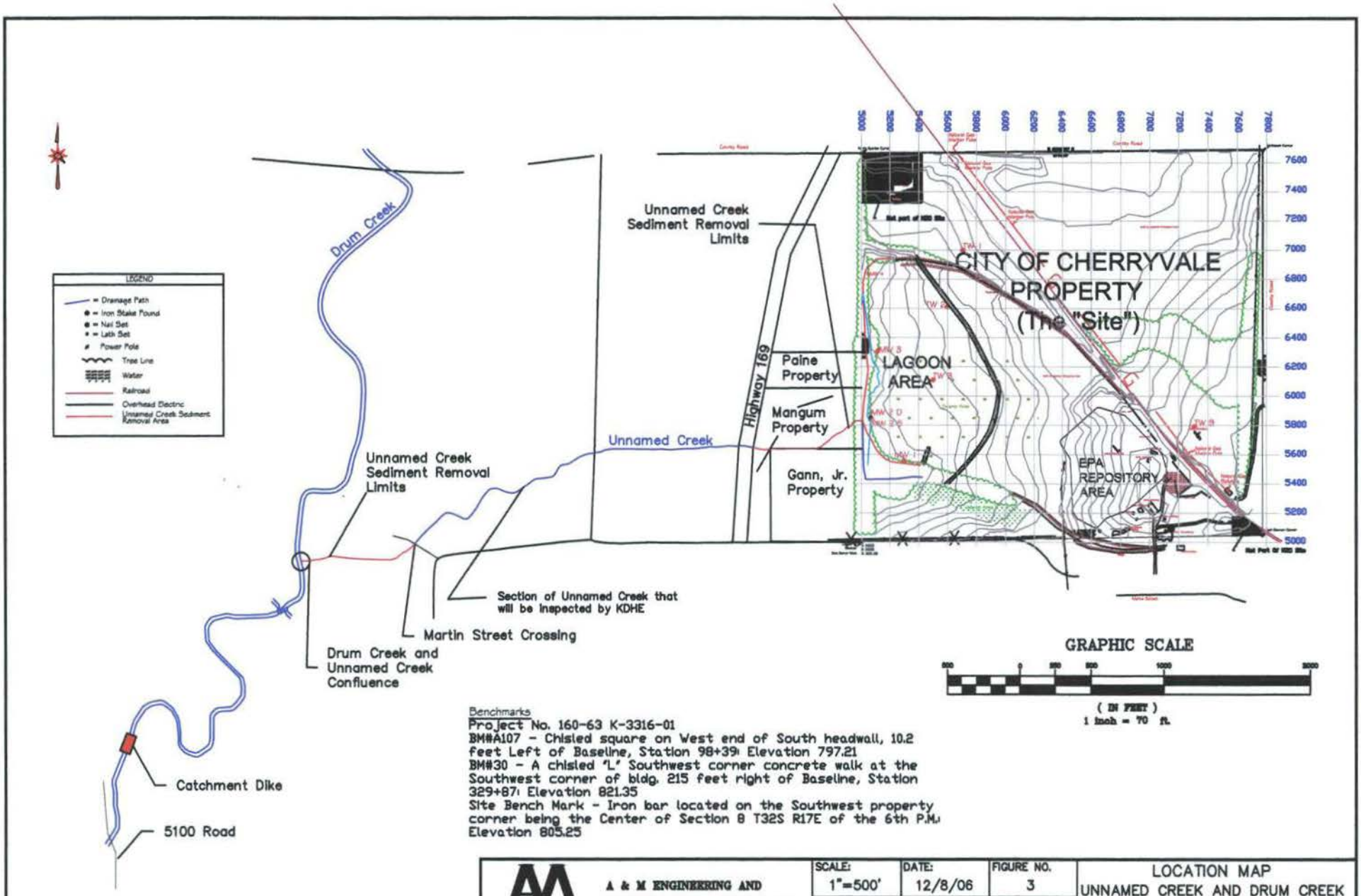
4.3 Unnamed Creek Remediation

The visible sediments in the Unnamed Creek from the Site to Confluence will be removed and consolidated in the on-Site Disposal Area. The amount of sediment to be removed from the Unnamed Creek is estimated at approximately 2,000 cy. Approximately 1,500 cy of these sediments will come from the Site to Martin Street Crossing and 500 cy from Martin Street Crossing to Confluence section. When the

Contractor is selected the portions of Unnamed Creek between Highway 169 and Martin Street Crossing will be inspected by KDHE, Respondents and their Contractor to jointly determine if any visible sediments are present that require removal.

The isolated shallow depressions along the Unnamed Creek that are created by erosion or by agricultural equipment moving through the area will be graded after the sediments are removed to prevent future water stagnation.

Figure 3 shows Unnamed Creek sediment removal areas and Figure 4 shows the Drum Creek and Unnamed Creek Confluence remediation area.



Benchmarks
Project No. 160-63 K-3316-01
BM#A107 - Chisled square on West end of South headwall, 10.2 feet Left of Baseline, Station 98+39. Elevation 797.21
BM#30 - A chisled 'L' Southwest corner concrete walk at the Southwest corner of bldg. 215 feet right of Baseline, Station 329+87. Elevation 821.35
Site Bench Mark - Iron bar located on the Southwest property corner being the Center of Section 8 T32S R17E of the 6th P.M. Elevation 805.25

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	SCALE: 1"=500'	DATE: 12/8/06	FIGURE NO. 3	LOCATION MAP UNNAMED CREEK AND DRUM CREEK FORMER NATIONAL ZINC SITE CHERRYVALE, KANSAS
ENGINEERING - ENVIRONMENTAL - CONSTRUCTION	APPROVED BY: AME	DRAWN BY: OME	PROJECT NO. 1804-003	

NOTES:
Staging areas will have liner and proper drainage to contain excavated sediments

Staging Area
EPA Borrow Area
Existing gravel road will be extended to the Staging Area
CITY PROPERTY
TINCKNELL PROPERTY
New City Discharge
Dike
Unnamed Creek
City Right of Way
Martin Street
Proposed Access Road
FLANDERS PROPERTY
Staging Areas
Martin Street Crossing
Confluence Area
Drum Creek
Old City Discharge
Main Street

KEY
Sediment Removal Area
Property Limits

DIKE PLAN
Scale: As Noted

DIKE CROSS-SECTION
Scale: As Noted

GENERAL NOTES

REVISIONS

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DRUM CREEK AND UNNAMED CREEK CONFLUENCE REMEDIATION AREA
FORMER NATIONAL ZINC SIRE
CHERRYVALE, KANSAS

DATE 1-3-2006 | NTS | 1804-003 | FIGURE 4

4.4 Drum Creek Remediation

Remediation of the Drum Creek is based on a twofold strategy: (1) removal of the visible sediments from the Drum Creek bed and (2) prevention of sediment migration to downstream. Using this strategy prevention of sediment migration will be the first phase of the project. This will prevent future sediment migration and sediment migration during the sediment removal.

Prevention of sediment migration involves installation of a Catchment Dike system to trap and prevent migration of the sediments. The best location for the Catchment Dike system is determined to be approximately 4.75 miles downstream of the Confluence. The Catchment Dike system will be installed prior to any sediment removal from Drum Creek and the Unnamed Creek. Figure 5 shows the location on Drum Creek where the Catchment Dike system will be constructed, and Figure 6 shows the Engineering Design of the Sediment Dike system.

Sediments that migrated to the Drum Creek came via the Unnamed Creek and concentrated mostly around the Confluence and a 300-ft section of the Drum Creek downstream of the Confluence. Therefore, sediment removal will concentrate within the Confluence and 300-ft downstream zone of the Drum Creek. The Drum Creek and Unnamed Creek Confluence area, access roads and staging areas to be constructed as well as the property owners that are affected by the remediation activities, are shown on Figure 4.

4.5 RA Plan for Drum Creek and Unnamed Creek Remediation

The following presents the Tasks the Respondents propose to follow in performing the Drum Creek and Unnamed Creek Remediation:

Task 1. Develop and Submit a RA Plan to KDHE

The final RA Plan will be submitted to KDHE within 30 days after KDHE issues its final removal action decision.

Task 2. Obtain Permits and Complete Access Agreements

Following final approval of the RA Plan by KDHE we will obtain all necessary permits and finalize the access agreements with the property owners.

Task 3. Prepare and Send Bid Packages to Bidders

The Bid Package for the sediment removal from the Unnamed Creek, Drum Creek and Catchment Dike construction will be part of the Former National Zinc Site Land Reclamation project Bid Package.

Task 4. **Contract Award**

Task 5. **Sediment Catchment Dike System Construction**

Mobilize
Construct entrance, access road and Staging Area
Construct the sediment Catchment Dike system
Prepare the side slopes and place riprap
Complete the service road construction

The Access road and Staging Area construction will be as specified in the Engineering Design and Construction Drawings, Engineering Specifications and CQA.

Task 6. **Remove Visible Sediments from Unnamed Creek between the Site and Martin Street Crossing**

Mobilize
Inspect segment of Unnamed Creek between Highway 169 and Martin Street Crossing with KDHE to determine if any visible sediment exist in this segment that require removal.
Remove all visible sediments
Transport and dispose sediments at the on-Site Disposal Area
Grade the Creek bed and slopes

Task 7. **Flow Control Dike Construction**

Construct a temporary flow control dike below the City Outfall and above the Confluence as shown in the Engineering Design and Construction Drawings as well as a pumping system with sufficient capacity to pump upstream waters of the Drum Creek to downstream of the construction zone.

Task 8. **Drain Drum Creek**

Drain Drum Creek at the Confluence and a 300-ft long construction zone to prepare the site for sediment removal.

Task 9. **Remove Visible Sediments from Unnamed Creek between the Confluence and Martin Street Crossing**

Mobilize
Construct Access Road and Staging Area
Remove all visible sediments
Transport and dispose sediments at the on-Site Disposal Area
Grade the Creek bed and slopes

Access Road and Staging Area construction will be as specified in the Engineering Design and Construction Drawings, Engineering Specifications and CQA.

Task 10. Remove Visible Sediments from Drum Creek between the Confluence and approximately 300 feet downstream from the Confluence

Mobilize
Construct Access Road and Staging Areas
Remove all visible sediments
Transport and dispose of sediments at the on-Site Disposal Area
Grade the Creek bed and slopes

Task 11. Remove the Temporary Dike and Restore the Area

Remove the temporary dike, restore all disturbed areas to its original state, and demobilized. The riprap stone removed from the temporary dike will be used for the Creek bank stabilization within the Confluence area.

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

GENERAL NOTES

REVISIONS

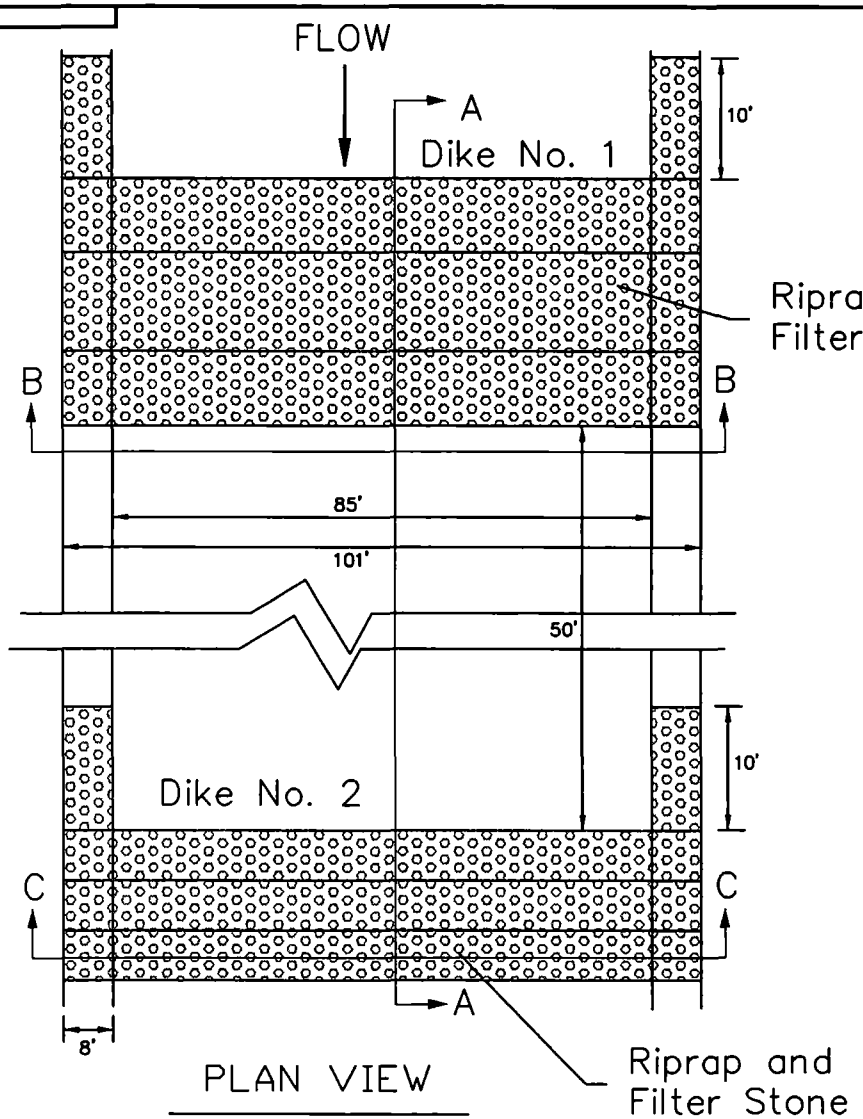
NO.	DESCRIPTION	BY	CHECKED	DATE	NO.	DESCRIPTION	BY	CHECKED	DATE

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

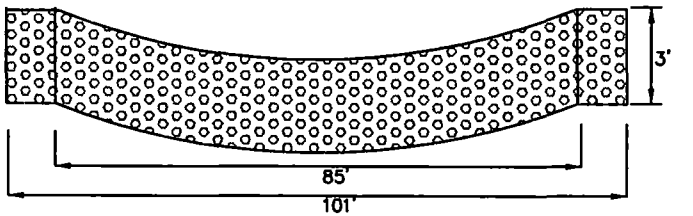
DRAWN	CHECKED BY	SCHEDULE BY	DESIGNED	APPROVED BY	SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
DHE 1-27-2006	DATE	DATE	DHE 1-27-2006	AHE 1-27-2006	NTS	1804-003	FIGURE 5	

SEDIMENT CATCHMENT DIKE LOCATION
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS



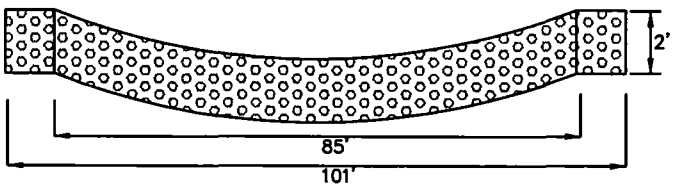
PLAN VIEW

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



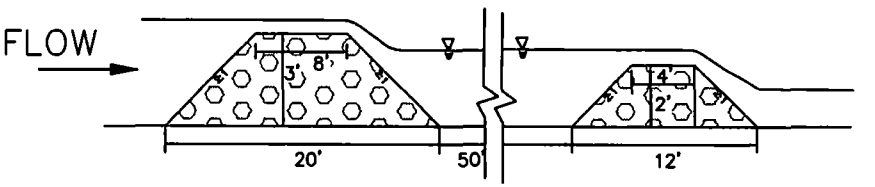
SECTION B-B

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 shall 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	DESIGNED BY	APPROVED BY	SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
OME	AME	AME	OME	AME		1804-003	FIGURE 6	
DATE 1/12/2005	DATE 1/12/2005	DATE 1/12/2005	DATE 1/12/2005	DATE 1/12/2005				

SEDIMENT CATCHMENT DIKE
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS

5.0 ENGINEERING DESIGN, ENGINEERING SPECIFICATIONS AND QUALITY ASSURANCE/QUALITY CONTROL

Engineering Design and Construction Drawings and Engineering Specifications are prepared to complement each other and should be applied in full context for this project. In addition to the Engineering Design, Specifications and CQA, the Kansas Department of Transportation (KDOT) Material Specifications and National Crushed Stone Association's Quarried Stone for Erosion and Sediment Control Guidelines, are used in the Engineering Design for access roads, riprap and Catchment Dike system.

In the event of any conflict between the Specifications on the one hand, and the CQA and Engineering Design on the other hand, the Engineering Design and CQA will control.

5.1 Engineering Design of On-Site Disposal Area

The former Lagoon located at the west of the Site will be used as an on-Site Disposal Area. The former Lagoon area will be cleared, grubbed, graded and the surface will be conditioned by placing clean soil to receive material. The Engineering Design and Construction Drawings of the on-Site Disposal Area are included in Appendix C.

Prior to startup of any remediation work, the Storm Water Management system (SWM), on-Site Disposal Area and access roads to and from the Disposal Area, and Drum Creek Catchment Dike system must be in place.

Sediments placed in the Deposit Area will be placed in 12" compacted lifts and compacted to 90% Standard Proctor compaction.

Following consolidation of all material from Impacted Areas and sediments from Drum Creek and Unnamed Creek, the surface will be graded and prepared for capping. The Cap system for the Disposal Area will be 12 inches clay liner and 6 inches vegetative soil.

During capping drainage system will be set in place as shown in the Engineering design and Construction Drawings. Following completion of the capping, riprap stone will be placed as shown in the Engineering Design and Construction Drawings, and Engineering Specifications. The Disposal Area will be permanently vegetated.

5.2 Engineering Specifications

The Engineering Specifications have been prepared specifically for this project and are presented in Appendix C. The Specifications are designed to complement the Engineering Design and CQA. If there is any conflict between the Engineering Design, CA and Specifications, Engineering Design and CQA will supersede. The list of the Specifications presented in Appendix C are as follows:

Section	01010	Summary of Work
Section	01560	Environmental Protection
Section	02221	Clay Liner/Cap
Section	02870	Crushed Stone, Riprap, and Soil Material
Section	02925	Seeding and Fertilizing

5.3 Construction Quality Assurance Plan

A site-specific CQA plan has been prepared for the project and presented in Appendix C. The CQA plan addresses the material and material placement and testing requirements for the Clay Liner/Cap construction of the Disposal Area, and the Impacted Areas with Deed Restriction areas. Engineering Specifications Section 02221 have been prepared to complement the CQA plan.

5.3.1 Cap Construction

Under the Engineering Design Capping of the Disposal Area and Impacted Areas a Deed Restriction is required.

The Capping System will be 12 inches clay liner and 6 inches of vegetative soil. Clay Liner material, placement and testing will meet the clay cap specifications as defined under the Engineering Design and Construction Drawings, Engineering Specifications and CQA program.

5.3.2 Placement of Fill Material

Following the removal of the material from Impacted Areas all excavated areas will be filled with clean soil and graded.

All fill material will be compacted to 90% Standard Proctor.

5.3.3 Placement of Vegetative Cover

All Clay Cover/Cap will be finished with a minimum of 6-inch thick compacted vegetative soil. The vegetative soil will meet the requirements for vegetative soil as defined under the Engineering Specifications, section 02870. Vegetative soil will be compacted to 90% Standard Proctor compaction. During the seeding of the Disposal and Impacted Areas the vegetative soil surface will be loosened to allow seeding of the surface.

5.4 Estimated Volumes of Impacted Soil Excavation and Soil Placement at the Site

The estimated volumes of excavation, clean clay and vegetative soil placement for the Impacted and Disposal areas at the Former National Zinc Site are as shown in the following table.

Estimated Excavated soil, and in place clean soil, clay and vegetative soil volumes

Impacted Areas	Excavation Volumes (CY)	Clean Soil Volumes (CY)	Clay Soil Volumes (CY)	Vegetative Soil Volumes (CY)
Zone 1	64,000	64,000		
Zone 3	61,000	61,000		
Zone 4	12,000	12,000		
Zone 5	48,400	48,400		
Zone 6	5,000	5,000	3,000	1,000
Zone 7	2,200	2,200		
EPA Repository	400	400		
Disposal Area			46,000	21,000
TOTAL	193,000	193,000	49,000	22,000

5.5 Estimated Volumes of Sediments from Drum Creek and Unnamed Creek Remediation

Estimated Sediment Volumes from Drum Creek and Unnamed Creek

Location	Estimated Sediment Volumes (CY)
Unnamed Creek Between Site and Martin Street Crossing	1,500
Unnamed Creek Between Martin Street Crossing and Confluence	500
Drum Creek at the Confluence	2,200
TOTAL	4,200

6.0 MITIGATION MEASURES DURING CONSTRUCTION

During the Construction period Mitigation measures will be applied to prevent:

1. Water pollution
2. Noise and air pollution
3. Dust pollution
4. Erosion and sediment pollution

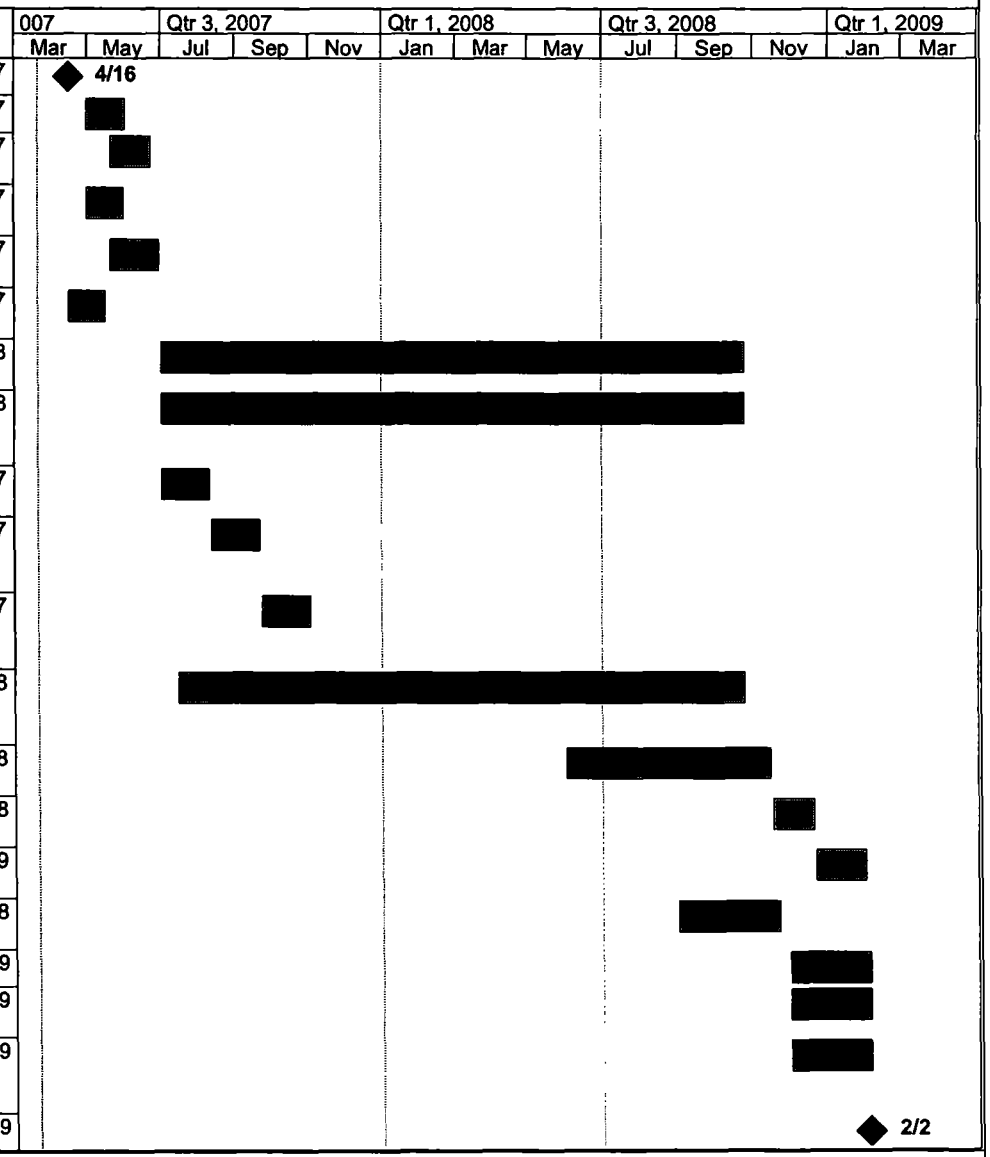
Mitigation measures to be applied for this project are presented in the Engineering Specifications, Section 01560 – Environmental Protection. It is the responsibility of the Contractor to apply these mitigation measures as they are warranted.

7.0 SCHEDULE

The construction schedule for the Remedial Action including the Site remediation, Unnamed Creek and Drum Creek sediment removal is presented in Figure 7.

REMOVAL ACTION CONSTRUCTION SCHEDULE
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS

ID	Task Name	Duration	Start	Finish
1	Contract Award	0 days	Mon 4/16/07	Mon 4/16/07
2	TASK 1: Mobilization	24 days	Tue 5/1/07	Fri 6/1/07
3	TASK 2: Flag the Grid System and Excavation Zones	25 days	Mon 5/21/07	Fri 6/22/07
4	TASK 3: Construct Entrance Areas and Service Roads	23 days	Tue 5/1/07	Thu 5/31/07
5	TASK 4: Prepare On-Site Disposal Area	30 days	Mon 5/21/07	Fri 6/29/07
6	TASK 5: Prepare Borrow Area for Operation	22 days	Mon 4/16/07	Tue 5/15/07
7	TASK 6: Start Excavation of Soils above the NRRSK from the Site	345 days	Mon 7/2/07	Fri 10/24/08
8	TASK 7: Transport and Place Contaminated Soils in On-Site Disposal Area	345 days	Mon 7/2/07	Fri 10/24/08
9	TASK 8: Construct Sediment Catchment System	30 days	Mon 7/2/07	Fri 8/10/07
10	TASK 9: Excavate Visible Sediment from the Unnamed Creek - Transport and Place in On-Site Disposal Area	30 days	Mon 8/13/07	Fri 9/21/07
11	TASK 10: Excavate Visible Sediment from Drum Creek - Transport and Place in On-Site Disposal Area	30 days	Mon 9/24/07	Fri 11/2/07
12	TASK 11: Place Clean Fill Material in Excavated Areas and Grade the Site for Drainage	335 days	Mon 7/16/07	Fri 10/24/08
13	TASK 12: Construct Cap System for On-Site Disposal Site	120 days	Mon 6/2/08	Fri 11/14/08
14	TASK 13: Vegetate the Disposal Area and the Disturbed Areas at the Site	25 days	Mon 11/17/08	Fri 12/19/08
15	TASK 14: Survey and Fence the Restrictive Covenant Areas	30 days	Mon 12/22/08	Fri 1/30/09
16	TASK 15: Implement Land Reclamation Plan at Borrow Area	60 days	Mon 9/1/08	Fri 11/21/08
17	TASK 16: Demobilization	46 days	Mon 12/1/08	Mon 2/2/09
18	TASK 17: Prepare As-Built Drawing and Certification Document	46 days	Mon 12/1/08	Mon 2/2/09
19	TASK 18: Complete Regulatory Procedures for Restricitve Convenant Areas	46 days	Mon 12/1/08	Mon 2/2/09
20	PROJECT COMPLETE	0 days	Mon 2/2/09	Mon 2/2/09



Project: Former National Zinc Site
Date: Tue 3/20/07

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

FIGURE 7

APPENDIX A

DEPARTMENT OF AGRICULTURE
ADRIAN J. POLANSKY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

September 29, 2006

UNITED STATES STEEL CORP
RICHARD L MENOZZI
600 GRANT STREET RM 2068
PITTSBURG PA 15219

Re: Sediment Catchment Dike
Drum Creek
Montgomery County
WSN: SMG-0091, Notice No.: 2006259

Dear Mr. Menozzi:

Consideration has been given to your application for a permit and approval of plans relating to the construction of a sediment catchment structure in and across Drum Creek at a location in the SW 1/4 of the SW 1/4 of the NW 1/4 of Section 30, Township 32 South, Range 17 East, Montgomery County, Kansas.

In accordance with the provisions of K.S.A. 82a-301 to 305a, the Chief Engineer has approved the plans and issued the enclosed permit, authorizing construction of the proposed project. Please note the conditions on the reverse side of the permit. Condition No. 9 requires the permittee to notify this office within 30 days after the project is completed. A Notice and Proof of Completion form is enclosed for this purpose. Special conditions have been added to limit the removal of timber and vegetation, to require the use of clean material for riprap, to prohibit the introduction of toxic or deleterious materials into the watercourse, to prohibit excess material from being deposited in the floodplain not shown on the approved plans and to establish a benchmark to which all project elevations are referenced, and to allow for the construction of a temporary crossing.

The one set of plans submitted to this office has been endorsed with the Chief Engineer's approval and will be retained in our files. Should you desire any copies of the plans with the Chief Engineer's approval shown thereon, please submit the required number.

Comments about this proposed project were received from several agencies during the environmental review process. Copies of the letters with recommendations from the environmental review agencies are enclosed for your information.

B. A.
A.M.E
File

The work has been authorized to be completed on or before January 1, 2009. Approval for construction of this project will expire on that date unless the time is subsequently specifically extended by the Chief Engineer. Any desired extension of time should be requested in writing approximately 30 days prior to the expiration date.

Sincerely,

David E. Nagle

David E. Nagle
Water Structures Engineer
(785) 296-6897

DEN/dn
Enclosure
pc: Altay M. Ertugrul, P.E.
A & M Engineering, Inc.
Montgomery County Floodplain Administrator

K A N S A S

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

June 29, 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: Responses to KDHE comments on the Supplement to Remedial Action Design Report, National Zinc Site, Cherryvale, KS

Dear Sirs:

The Kansas Department of Health and Environment (KDHE) has reviewed responses to comments provided on the supplemental Remedial Action Design Report for the (former) National Zinc Site in Cherryvale, Kansas. The responses were submitted to KDHE on June 19, 2006 on behalf of United States Steel Corporation and Salomon Smith Barney Holdings, Inc. by Doerner, Saunders, Daniel & Anderson, L.L.P. The responses have adequately addressed the issues raised in KDHE's review letter of June 9, 2006. With respect to KDHE's comment 7, KDHE had hoped A&M Engineering would be able to provide supporting calculations to evaluate how sediments accumulated in the sediment capture structure will respond to high water events. The Respondents have elected to use empirical data to evaluate the effectiveness and performance of the design, and consequently the need for future modifications may be identified based on performance. Please proceed to submit a revised Remedial Action Design report reflecting the comment responses. 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. Call me at (785) 296-1671 or e-mail me at klimesan@kdhe.state.ks.us if I may provide any more information.

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

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

DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
STATE REGULATORY PROGRAM OFFICE - KANSAS
2710 N.E. SHADY CREEK ACCESS ROAD
EL DORADO, KANSAS 67042

REPLY TO
ATTENTION OF:

May 23, 2006

Kansas State Regulatory Office
(200601379)
(Montgomery, KS, NW 38)

Mr. Altay M. Ertugrul
A&M Engineering and Environmental Services, Inc.
10010 East 16th Street
Tulsa, Oklahoma 74128

Dear Mr. Ertugrul:

This is in response to your application received on April 24, 2006 for a Department of the Army (DA) permit concerning remediation in Drum Creek and Unnamed Creek. The project is located in Section 8, Township 32 south, Range 17 east; Section 7, Township 32 south, Range 17 east and Section 30, Township 32 south, Range 17 east, Montgomery County, Kansas.

The Corps of Engineers has jurisdiction over all waters of the United States. Discharges of dredged or fill material in waters of the United States, including wetlands, require prior authorization from the Corps under Section 404 of the Clean Water Act (33 USC 1344). The implementing regulation for this Act is found at 33 CFR 320-330.

This letter contains an approved jurisdictional determination for your proposed project. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 C.F.R. Part 331. Enclosed you will find a Notification of Administrative Appeal Options and Process (NAP) and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the Northwestern Division Office at the following address:

Mores V. Bergman, Appeals Review Officer
U.S. Army Corps of Engineers
Northwestern Division (ATTN: CENWD-CM-OR)
12565 West Center Road
Omaha, NE 68144-3869
Voice: 402-697-2533 – FAX: 402-697-2538

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 C.F.R. Part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by July 23, 2006.

It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this letter.

In the event that you disagree with an approved jurisdictional determination, and you have new information not considered in the original determination, you may request reconsideration of that determination by the Corps District prior to initiating an appeal. To request this reconsideration based upon new information, you must subject the completed RFA form and the new information to the District Office so that it is received within 60 days of the date of the NAP. Send approved jurisdictional determination reconsideration requests to:

District Commander
ATTN: Joseph S. Hughes
Chief, Regulatory Branch
U.S. Army Engineer District, Kansas City
601 East 12th Street, Room 706
Kansas City, MO 64106-2896
Voice: 816-389-3990 – FAX: 816-389-2032

We have reviewed the information furnished and have determined that your project is authorized by nationwide permit **(NWP) 38**, provided you ensure that the conditions listed in the enclosed copy of excerpts from the January 15, 2002 Federal Register, Issuance of Nationwide Permits; Notice (67 FR 2020), and the February 13, 2002 Correction (67 FR 6692) are met. You must also comply with the Kansas City District Regional NWP Conditions posted at http://www.nwk.usace.army.mil/regulatory/regulatory.htm.
General condition 14 requires you to sign and submit the enclosed "Compliance Certification" upon completion of the authorized work and any required mitigation.

This NWP verification is valid until the NWP is modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2007. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have twelve (12) months from the date of the modifications or revocation of the NWP to complete the activity under the present terms and conditions of this NWP.

Although an individual DA permit is not required, other Federal, state and/or local permits may be required. You should verify this yourself. The Kansas Department of Health and Environment (KDHE) has certified that this NWP will not violate existing state water quality standards provided you comply with the conditions included in their attached letter. All conditions included in the water quality certification become conditions of the NWP authorization, please carefully review all conditions associated with this NWP. If you have any questions concerning state water quality standards or compliance issues with the associated certification conditions, please contact KDHE at 785-296-5573, Bureau of Water - NPS Section, 1000 SW Jackson Street, Suite 420, Topeka, Kansas 66612-1367.

We are interested in your thoughts and opinions concerning your experience with the Kansas City District, Corps of Engineers Regulatory Program. We have placed an automated version of our Customer Service Survey form on our website at: http://per2.nwp.usace.army.mil/survey.html. At your request, we will mail you a paper copy that you may complete and return to us by mail or fax.

Ms. Debra K. Woodward, Regulatory Specialist, reviewed the information furnished and made this determination. If you have any questions concerning this matter, please feel free to contact Ms. Woodward at 316-322-8247 (FAX 316-322-8259). Please reference Permit No. 200601379 in all comments and/or inquiries relating to this project.

Enclosures

Copies Furnished:

Kansas Department of Wildlife
and Parks wo/enclosures

U.S. Fish and Wildlife Service,
Manhattan, Kansas wo/enclosures

Kansas Department of Agriculture
wo/enclosures

RODERICK L. BREMBY, SECRETARY

KANSAS

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

March 21, 2006

Doerner, Saunders, Daniel and Anderson, L.L.P
William C. Anderson
320 South Boston Avenue, Suite 500
Tulsa, Oklahoma 74103-3725

RE: National Zinc Site, Cherryvale, Kansas

Dear Mr. Anderson:

The Kansas Department of Health and Environment (KDHE) has reviewed your February 6, 2006 submittal regarding the document titled, "Design Basis Memorandum for Drum Creek Catchment" for the National Zinc Site in Cherryvale, Kansas. This letter officially approves the design memorandum provided the following information is provided to KDHE.

KDHE offers the following comments regarding the design memorandum and project.

1. KDHE recommends that the Respondents discuss this project 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-dike design may hinder or inhibit the migration of fish during normal flow conditions. Please provide documentation of this contact.

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

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-dike system to withstand this flow rate and the effect of higher flow rates on contaminated sediment accumulated in the catchment basin system.

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

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)

K A N S A S

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

April 27, 2005

William C. Anderson
Doerner, Saunders, Daniel & Anderson, L.L.P.
320 South Boston Avenue, Suite 500
Tulsa, OK 74103-3725

David L. Smiga
United States Steel Corporation
600 Grant Street, Room 1500
Pittsburgh, PA 15219-2800

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

Dear Messrs. Anderson and Smiga:

The Kansas Department of Health and Environment (KDHE) has reviewed the document received March 31, 2005 requesting approval to utilize a cap system consisting of 12 inches of compacted clay and 6 inches of vegetative soil for capping the onsite disposal area at the above referenced site. This document was submitted by A & M Engineering & Environmental Services, Inc. (A & M) on behalf of the Respondents, United States Steel Corporation and Salomon Smith Barney Holdings, Inc. Consistent with the Environmental Protection Agency (EPA) Repository Area cap, KDHE approves the request for a cap system of 12 inches of compacted clay and 6 inches of vegetative soil. KDHE looks forward to reviewing the Remedial Action Plan that will include the Respondents' plan for a vegetative cover that will not affect the integrity of the cap system.

During the December 14, 2004 Public Meeting to present the Remedial Action Design Report, a citizen of Cherryvale expressed concerns of potential exposure to heavy metals in the form of fugitive dust generated on Martin Street during periods of dry weather. Fugitive dust makes contact with residential homes to the south of Martin Street. The KDHE project manager has not found evidence that soils associated with Martin Street have ever been sampled for heavy metals. Consequently, KDHE requests that during the next mobilization to the site the Respondents collect representative depth stratified soil samples from the Martin Street roadbed to be analyzed for heavy metals. At a minimum, KDHE expects at least two locations on the roadway be sampled at six inch intervals to either the native soil horizon or 18 inches in depth, whichever is less.

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.kdhe.state.ks.us/

received
4/29/05

KDHE requests that seven (7) days notice be given before any field work is implemented, so that KDHE may choose to be present. Should you have any questions, please do not hesitate to contact me by telephone at 785-296-6437 or by e-mail at rbixby@kdhe.state.ks.us.

Sincerely,

Robert Bixby
Geologist/Hydrologist
Remedial Section
Bureau of Environmental Remediation

C. Kurt Limesand→ file National Zinc, Cherryvale (C3-063-00025-01)
Mark Rupnow, United States Steel Corporation
Altay M. Ertugrul, A&M Engineering & Environmental Services, Inc.

K A N S A S

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

November 4, 2004

William C. Anderson
Doerner, Saunders, Daniel & Anderson, L.L.P
320 South Boston Avenue, Suite 500
Tulsa, OK 74103-3725

David L. Smiga
United States Steel Corporation
600 Grant Street, Room 1500
Pittsburgh, PA 15219-2800

RE: Former National Zinc Site, Cherryvale, Kansas

Dear Messrs. Anderson and Smiga:

The Kansas Department of Health and Environment (KDHE) has reviewed the document entitled "Groundwater Measurement Results at Former National Zinc Site, Cherryvale, Montgomery County, Kansas, Addendum to Hydrogeological Investigation Report (December 2003)" received by KDHE on September 24, 2004. The document was submitted by A & M Engineering and Environmental Services, Inc. on behalf of the Respondents, United States Steel Corporation and Salomon Smith Barney Holdings, Inc. This document serves as KDHE's "Notice of Approval" for the Groundwater Measurements Results Report and is accepted as an addendum to the Hydrogeological Investigation Report dated December 2003. The Hydrogeological Investigation Report was submitted as Appendix B of the Remedial Action Design (RAD) Plan. KDHE hereby acknowledges that the amended Hydrogeological Investigation Report (complete with Groundwater Measurement Results addendum) is now incorporated into the Consent Order as part of the RAD Report dated July 2004.

Should you have any questions, please do not hesitate to contact me by telephone at 785-296-6437 or by e-mail at rbixby@kdhe.state.ks.us.

Sincerely,

Robert Bixby
Geologist/Hydrologist
Remedial Section
Bureau of Environmental Remediation

C. Kurt Limesand→ file National Zinc, Cherryvale (C3-063-00026-01)
Mark Rupnow, United States Steel Corporation
Altay M. Ertugrul, A&M Engineering & Environmental Services, Inc.

DOERNER, SAUNDERS, DANIEL & ANDERSON, L.L.P.

ATTORNEYS AT LAW

320 SOUTH BOSTON AVENUE, SUITE 500
TULSA, OKLAHOMA 74103-3725
TELEPHONE (918) 582-1211
FACSIMILE (918) 591-5360

ONE LEADERSHIP SQUARE, SUITE 601
211 NORTH ROBINSON
OKLAHOMA CITY, OKLAHOMA 73102-7112
TELEPHONE (405) 319-3500
FACSIMILE (405) 319-3509
www.dsda.com

October 20, 2004

VIA FEDERAL EXPRESS
Mr. Robert Bixby
Geologist/Hydrologist/Remedial Section
Bureau of Environmental Remediation (BER)
Kansas Department of Health & Environment
1000 Southwest Jackson, Suite 410
Topeka, Kansas 66612-1367

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

Dear Mr. Bixby:

This refers to the Remedial Action Design (RAD) Report dated July 2004, the KDHE "Notice of Approval" letter dated September 13, 2004, and the KDHE considerations or comments set forth in the "Notice of Approval" letter.

The Respondents have considered KDHE's comments and concur therewith. Specific responses to each comment are set forth below:

KDHE
Comment: KDHE requests that the Respondents provide detailed plans for re-vegetation of the proposed cap associated with the closed lagoon. The capping requirements for the closed lagoon consist of 18 inches of compacted clay layer and 6 inches of topsoil with vegetation. The capping requirements for 6 inches of topsoil should be considered a minimum as the 6-inch depth of the topsoil layer may not be sufficient based on the

species of vegetation selected for the cover. It is important that the type of vegetation selected not have a root zone that will penetrate the clay layer compromising its structural integrity.

Response: A detailed vegetation and cover plan will be included as part of the Remediation Action (RA) Plan. Special attention will be given to selecting a type of vegetation in consultation with KDHE with a root zone that will not penetrate the clay layer.

KDHE Comment: A discrepancy can be observed between the repository depths on Figure 5 and depths represented by cross-sections on Figure 6. For example, from Figure 5 Sample No. 19, the repository depth is noted at 5.05 feet but represented in the cross-section from Figure 6 as approximately 12 feet. KDHE understands that the cross-sections are meant to be an estimate of repository depth and likely include discrepancies associated with data gaps from grid section subsurface sampling. KDHE requests that the Respondents provide a brief discussion of the repository depths, represented in the table on Figure 5: *EPA Repository Area Sampling Locations*, as they relate to the cross-sections provided on Figure 6: *EPA Repository Area Cross Sections*.

Response: A&M Engineering and Environmental Services, Inc. ("A&M") has reviewed Figures 5 and 6 and compared the depth data presented in those figures with its field notes. Figure 6 has been revised, and is included as an enclosure with this letter (three copies). Please insert the revised Figure 6 in the KDHE copies of the RAD Report.

KDHE Comment: 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.

Response: The Respondents are amenable to holding further discussions with KDHE concerning Drum Creek following the completion of the proposed down-stream sampling.

KDHE Comment: 3.3.3. Off Site Groundwater - The text states that the Hydrogeological Investigation Report is included in Appendix D. Please indicate the actual location of the Hydrogeological Investigation as Appendix B. Although

no evidence of off-site ground water impacts from metals has been observed to date, KDHE requests that the Respondents begin a semi-annual ground water monitoring program of off-site wells MW6, MW7, and MW8 to be analyzed for arsenic, cadmium, and zinc.

Response: Page 19 of the RAD Report has been corrected by changing the reference to Appendix D to Appendix B, and three copies of the revised page 19 are included as a second enclosure to this letter. Please insert the revised page 19 in the KDHE copies of the RAD Report. The Respondents will begin a semi-annual groundwater monitoring program for MW6, MW7, and MW8, to start in the fall of 2004 and continue for two additional sampling events ending in the fall of 2005. In addition to sampling MW6, MW7, and MW8, the Respondents will also sample the background well, MW5, on the same schedule. The wells will be analyzed in the field for temperature, pH and semi-conductance. Respondents understand that the reference in KDHE's comment to "arsenic, cadmium and zinc" as the metals to be sampled for was in error, and that the correct list of metals should be "arsenic, cadmium, lead, chromium and silver." Accordingly, the wells will be sampled and analyzed in the lab for those five metals. A summary report will be submitted to the KDHE for review following each sampling event.

In addition to substituting the two enclosed revised pages in the July 2004 RAD Report, the Respondents will, as suggested at the close of your letter of September 13, 2004, also address KDHE's comments in the RA Plan in a manner consistent with the responses set forth above.

Would you please confirm that the Respondents' responses herein to the comments in KDHE's letter of September 13, 2004, are acceptable to KDHE. Also, would you please further confirm that the RAD Report dated July 2004, as amended by the responses in this letter, is now incorporated into the captioned Consent Order as provided for in paragraph 38 thereof.

Thank you for your attention to this matter, and please give me a call if you have any questions.

Sincerely,

Bill Anderson

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

WCA/sm
Enclosures
cc: Rick Bean (w/encl.) – Via Facsimile and U.S. Mail
Kurt Limesand (w/encl.) – Via Facsimile and U.S. Mail

K A N S A S

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

September 13, 2004

William C. Anderson
Doerner, Saunders, Daniel & Anderson, L.L.P.
320 South Boston Avenue, Suite 500
Tulsa, OK 74103-3725

David L. Smiga
United States Steel Corporation
600 Grant Street, Room 1500
Pittsburgh, PA 15219-2800

RE: Former National Zinc Site, Cherryvale, Kansas

Dear Messrs. Anderson and Smiga:

The Kansas Department of Health and Environment (KDHE) has reviewed the document entitled, "Remedial Action Design Report for Former National Zinc Site, Cherryvale, Montgomery County, Kansas," received by KDHE July 27, 2004. The report was submitted by A&M Engineering and Environmental Services, Inc. (A&M) on behalf of the Respondents, United States Steel Corporation and Salomon Smith Barney Holdings, Inc. This letter serves as a "Notice of Approval" for the Remedial Action Design Report (RAD Report) with the following considerations:

- KDHE requests that the Respondents provide detailed plans for re-vegetation of the proposed cap associated with the closed lagoon. The capping requirements for the closed lagoon consist of 18 inches of compacted clay layer and 6 inches of topsoil with vegetation. The capping requirements for 6 inches of topsoil should be considered a minimum as the 6-inch depth of the topsoil layer may not be sufficient based on the species of vegetation selected for the cover. It is important that the type of vegetation selected not have a root zone that will penetrate the clay layer compromising its structural integrity.

- A discrepancy can be observed between the repository depths on Figure 5 and depths represented by cross-sections on Figure 6. For example, from Figure 5 Sample No. 19, the repository depth is noted at 5.05 feet but represented in the cross-section from Figure 6 as approximately 12 feet. KDHE understands that the cross-sections are meant to be an estimate of repository depth and likely include discrepancies associated with data gaps from grid section subsurface sampling. KDHE requests that the Respondents provide a brief discussion of the repository depths, represented in the table on Figure 5: *EPA Repository Area Sampling Locations*, as they relate to the cross-sections provided on Figure 6: *EPA Repository Area Cross Sections*.

DIVISION OF ENVIRONMENT
Bureau of Environmental Remediation
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- 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.

- 3.3.3 Off Site Groundwater - The text states that the Hydrogeological Investigation Report is included in Appendix D. Please indicate the actual location of the Hydrogeological Investigation as Appendix B. Although no evidence of off-site ground water impacts from metals has been observed to date, KDHE requests that the Respondents begin a semi-annual ground water monitoring program of off-site wells MW6, MW7, and MW8 to be analyzed for arsenic, cadmium, and zinc.

In order to facilitate the development of the Removal Action Design Plan (RAD Plan), KDHE suggests that the response to the above comments be addressed in the RAD Plan. Should this be acceptable to the Respondents, please consider this letter to be a "Notice of Approval" for the RAD Report. Please do not hesitate to contact me with any questions, you may reach me by telephone at 785-296-6437 or by e-mail at rbixby@kdhe.state.ks.us.

Sincerely,

Robert Bixby
Geologist/Hydrologist
Remedial Section
Bureau of Environmental Remediation

C. Kurt Limesand→ file National Zinc, Cherryvale (C3-063-00026-01)
Mark Rupnow, United States Steel Corporation
Altay M. Ertugrul, A&M Engineering & Environmental Services, Inc.
Leo Henning, KDHE

APPENDIX B

SOIL SAMPLING PROCEDURES

1 Purpose

The purpose of this soil sampling procedures is to set guidelines and standardize soil sampling during the Remedial Action Construction and RA verification of the Former National Zinc Site. The results of the soil sampling will either verify compliance; determine continuation of the excavation, or the implementation of the "Deed Restriction" requirements.

2 Soil Sampling

First soil sampling from Impacted Zones will start as follows:

a. Zones No. 1, 3, 4 and 6 will be excavated to the depths identified in Figure 2 prior to taking the first set of samples.

b. Zone 5 will be excavated up to 6" depth prior to taking the first set of samples.

c. Zone 7 sampling will start at the surface prior to any excavation.

The soil sampling from the surface of excavated areas will be based on a 100 x 100 feet grid system that will be set in the field separately for each Zone. The 100 x 100 feet grids will than be divided into 4 quarters (50 x 50 feet quarters) and sampled as follows:

a. One (1) composite sample, comprising of 4 individual samples taken from each quarter of the surface of the excavated areas.

b. The analytical results of the samples taken from each quarter will be combined for the analysis of each 100 x 100 grid system.

The soil sampling from the sidewalls will be by composite sampling. Four (4) random samples will be taken from each 50 ft. length of the sidewall and mixed to create each composite sample.

During surface and side wall sampling, the soil surfaces will be visually inspected for visible contamination (heavy metal coloration), if contamination is evident the Contractor with the approval of the Project Manager could decide to excavate the contaminated surface prior to sampling, sample the area separately, or sample as part of the 50 ft, sampling quarter.

If the results of the first soil sampling shows compliance excavation will stop at that level. If the sampling results show non-compliance a layer of 6" of impacted soil will be removed and tested again. Excavation of impacted soils will continue until either compliance is achieved or implementation of Deed Restriction is agreed upon.

3 Sampling Procedures

The following equipment will be used for soil sampling:

- Stainless steel mixing bowl
- Stirring spatula
- Shovel or coring tool
- Disposable Gloves
- Paper Towel
- Distilled water
- Alconox soap or equivalent.

Sampling equipment will be decontaminated with alconox or equivalent soap and triple rinsed with distilled water and dried before each sampling.

For soil sampling the following steps will be followed:

- Decontaminate sampling equipment
- Use clean disposable gloves to sample
- Take soil samples from the surface up to 3" depths
- Place samples into the bowl and thoroughly mix
- Place 250 ml sample of the mix into a sample jar and label the sample
- Decontaminate equipment

Soils samples will be kept on ice at all times and shipped to the Lab with a Chain of Custody.

4 Analytical Parameters

Soil samples will be analyzed for Total Lead, Cadmium, and Arsenic on a dry basis.

5 Implementation

The Quality Assurance Manager will be responsible for the implementation of the soil sampling procedures, identification of the soil sampling locations and communication with the Authorities. If split samples are required by KDHE two jars of composite samples will be taken from the each sample mix.

APPENDIX C

ENGINEERING SPECIFICATIONS

ENGINEERING SPECIFICATIONS

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Section 01010 Summary of Work

Section 01560 Environmental Protection

DIVISION II – SITEWORK

Section 02221 Clay Liner/Cap

Section 02870 Crushed Stone, Riprap, and Soil Material

Section 02925 Seeding and Fertilizing

PART 1 - GENERAL

1.1 SUMMARY

The project consists of removal of all contaminated soil from the Impacted Areas of the Former National Zinc Site, construction of a sediment Catchment Dike system over the Drum Creek, removal of all visible sediments at two locations from Unnamed Creek and one location from Drum Creek, construction of an on-site Disposal Area, placement of the sediments and contaminated soil in the Disposal Area, construction of two cap systems that will consist of 1-foot thick clay cap and 6-inch thick vegetative soil one for the Disposal Area and one for the Restrictive Covenant Area northeast of the EPA Repository Area , and filling the excavated Impacted Areas with clean soil. This project represents the remedial construction of the Former National Zinc Site located in Cherryvale, Kansas. The remedial construction is being done at the request of the Kansas Department of Health and Environment (KDHE).

1.2 RELATED DOCUMENTS

A. Engineering Design and Construction Drawings

B. Specifications, Sections 01010, 01560, 02221, 02870, and 02925

C. Construction Quality Assurance Program

1.3 SCOPE OF WORK

The scope of work will include:

A. Storm Water Management (SWM). The Construction contractor will receive all approvals and construct a SWM system before the start of any construction.

B. Preparation of the on-site Disposal Area. The Contractor will prepare the on-site Disposal Area for equipment access and to receive material from Impacted Areas and sediment from Drum Creek and Unnamed Creek. This work must be done prior to any remediation work at the Site and sediment from the Unnamed Creek and Drum Creek.

C. Remediation of the Impacted Areas of the Former National Zinc Site. The Contractor will prepare the area for equipment access and remove material from the Impacted Areas. The removed material will be placed into the on-site Disposal Area and compacted, if possible, to 90% Standard Proctor.

D. Construction of the Sediment Catchment Dike System. The Contractor will prepare the site and construct a sediment Catchment Dike system over Drum Creek at a location approximately 4.75 miles downstream of the Drum Creek and Unnamed

Creek Confluence (Confluence). The Catcment Dike system will be constructed prior to any sediment removal from Drum Creek or Unnamed Creek.

E. Removal of all visible sediments from Unnamed Creek between the Site and Highway 169. The Contractor will prepare the site for equipment access and remove all visible sediments from Unnamed Creek between the Site and Highway 169. The removed sediments will be transported and placed into the on-site Disposal Area. The sediment removal areas will then be graded.

F. Construction of a temporary dike. The Contractor will construct a temporary flow control dike below the City Outfall and above the Confluence as shown in the Engineering Design and Construction Drawings and a pumping system with sufficient capacity to pump upstream waters of the Drum Creek to downstream of the construction zone.

G. Removal of sediments from Unnamed Creek between Martin Street Crossing and the Confluence. The Contractor will prepare the area for equipment access, construct the Staging Area and remove all visible sediments. The removed sediments will than be transported and place into the on-site Disposal Area. The sediment removal areas will then be graded.

H. Removal of sediments at the Confluence and from the Confluence to the 300-foot mark downstream from Drum Creek. The Contractor will prepare the area for equipment access, construct the Staging Areas and remove all visible sediments. The removed sediments will than be transported and place into the on-site Disposal Area. The sediment removal areas will then be graded.

I. Capping of the Disposal Area. The Contractor will construct a Cap system that will include 1-foot thick clay liner and 6-inch thick vegetative soil as specified in the Engineering Design and Construction Drawings, Specifications and Construction Quality Assurance. Following installation of the Cap system the area will be fenced and vegetated as specified under Engineering Specifications Section 02925.

J. Filling of the Impacted Areas. Following the removal of the material from Impacted Areas all excavated areas will be filled with clean soil and graded as specified in the Engineering Design and Construction Drawings, Specifications, and Construction Quality Assurance.

K. Capping of the Restrictive Covenant Area located northeast of the EPA Repository Area. The Contractor will construct a Cap system that will include 1-foot clay liner and 6-inch vegetative soil as specified in the Engineering Design and Construction Drawings, Specifications and Construction Quality Assurance. Following installation of the Cap system the area will be fenced and vegetated as specified under Engineering Specifications Section 02925.

L. Construction Quality Assurance. Construction Quality Assurance during the construction shall be provided as specified under Engineering Specifications and Construction Quality Assurance Program.

M. Mitigation Measures. Mitigation measures during construction shall be applied to protect water, noise, dust, and erosion pollution as specified under Engineering Specifications, Section 01560.

N. Project Certification. Project Certification shall include as-built drawings, final surveying, data and information gathered on Quality Control and Quality Assurance, and if necessary post care and maintenance activities.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable) (END OF SECTION)

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes requirements relating to the Construction Contractor's responsibilities for environmental protection including prevention and control of erosion and sedimentation that results directly or indirectly from the project.

1.2 APPLICABLE REGULATIONS

The Construction Contractor and his subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

1.3 WATER POLLUTION

A. The Construction Contractor shall take all precautions necessary to avoid pollution of waters in adjacent watercourses or water storage areas including wells.

B. The Construction Contractor shall take all precautions necessary to prevent pollution of the downstream waters while working in the unnamed Creek and Drum Creek.

C. All earthwork, equipment movement, control of water in excavations and other operations which may create silting shall be conducted in a manner to keep water pollution to an absolute minimum.

D. Water used during the Contract work which has become polluted with oil, harmful or objectionable chemicals, sewage or other pollutants shall be disposed of in a manner that will not affect nearby waters and land. The Construction Contractor shall not, under any circumstances, discharge pollutants into any watercourse.

1.4 NOISE AND AIR POLLUTION

The Construction Contractor shall take all precautions necessary to avoid noise and air pollution during the course of the Project.

1.5 DUST CONTROL

A. The Construction Contractor shall maintain all work areas free from dust which would contribute to air pollution. Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, or similar methods will be permitted to control dust. Sprinkling, where used, must be repeated at such intervals as to

keep all parts of the disturbed area at least damp at all times. Dust control shall be performed as the work proceeds and whenever the dust nuisance or hazard occurs.

B. The use of road oils and waste oils to control dust is prohibited.

C. The Construction Contractor shall keep clean all streets used in his operations. Trucks hauling excavated materials, cement, sand, stone, or other loose materials from or to the site, shall be tight so that no spillage will occur. Before trucks start away from the site, their loads shall be carefully trimmed and covered, if required by the DOT, to prevent spillage.

1.6 EROSION AND SEDIMENTATION CONTROL

A. The Construction Contractor shall comply with the Standards and Specifications issued by the U.S. Department of Agriculture Soil Conservation Service, the Department of Health and Environmental Quality (KDHE), Water Quality Division, State of Kansas, The Corps of Engineers, City of Cherryvale and shall undertake preventative erosion and sediment control measures.

B. Erosion control measures shall consist of, but not be limited to the following:

1. The ground laid bare at any one time will be limited to that which is being worked upon.

2. Provide temporary silt retainment dams when pumping water from excavations.

3. Areas of water concentration which drain away from the site shall have straw berms or sediment trap pits or both constructed across the flow of water depending upon the size of the drainage area.

4. Stockpiles of earth shall be seeded to a temporary cover if they are to remain in place more than 30 days. Such stockpiles shall have straw bale dikes placed around the base so that soil will not wash from them.

5. Permanent stabilization of the area shall be done in accordance with the Contract Documents.

1.7 CLEANING UP

A. The Construction Contractor shall not allow the site of the work to become littered with trash and waste materials, and shall maintain the site in a neat and orderly condition throughout the period of the work. Cleaning up, including the restoration of areas of construction, shall proceed as quickly as is practicable after

construction is completed in any given area. This period, between construction and final cleanup, shall normally not exceed two weeks.

B. Within ten (10) days after the completion of the work and before final acceptance, the Construction Contractor shall, without charge therefore, tear down and remove all temporary structures built by him, shall remove all rubbish of all kinds from any ground which he has occupied, and shall leave the work site in a clean and orderly condition.

C. If at any time during the course of the work the cleaning up operation in any given area should become delinquent in the opinion of the Construction Project Manager, he may order that construction be stopped until such delinquent cleaning up is completed.

D. The Construction Contractor shall not be entitled to any additional compensation or extension of time of completion should any such stoppage of construction be ordered by the Construction Project Manager.

1.8 BURNING

Burning will be allowed only if approved by the property owner and by the local fire department.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

(END OF SECTION)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The Contractor shall furnish all labor, materials, tools, supervision, transportation and installation equipment necessary for the construction of the clay liner/cap (liner), as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.

B. The Contractor shall be prepared to construct the liner in conjunction with the earthworks and the installation and construction of the other components of the liner system.

C. Notwithstanding the prequalification of any material sources for the liner subbase, the Contractor shall be responsible for meeting the requirements of this Section.

1.2 REFERENCES

A. Construction Quality Assurance (CQA) Plan.

B. Latest version of American Society for Testing and Materials (ASTM) standards:

1. ASTM D 422. Standard Method for Particle-Size Analysis of Soils.

2. ASTM D 698. Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 5.5 pound Rammer and 12-inch Drop.

3. ASTM D 1140. Standard Test Method for Amount of Material in Soils Finer than the No. 200 Sieve.

4. ASTM D 2216. Standard Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil-Aggregate Mixtures.

5. ASTM D 2487. Standard Test Method for Classification of Soils for Engineering Purposes.

6. ASTM D 2922. Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

7. ASTM D 2937. Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.

8. ASTM D 3017. Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

9. ASTM D 4220. Standard Practices for Preserving and Transporting Soil Samples.

10. ASTM D 4318. Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

11. ASTM D 5084. Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible-Wall Permeameter.

1.3 SUBMITTALS

A. The Contractor shall notify the Construction Project Manager in writing a minimum of 7 days prior to starting construction of the liner. The notice shall state the material to be used, the equipment to be used, the date and time that placement operations will start and the name of the person in the field who will be in charge of the construction of the liner.

B. If work is interrupted for reasons other than inclement weather, the Contractor shall notify the Construction Project Manager a minimum of 24 hours prior to the resumption of work.

1.4 CONSTRUCTION QUALITY ASSURANCE

A. Construction of the liner shall be monitored and tested by the Soils Construction Quality Assurance (CQA) Engineer as outlined in the Construction Quality Assurance (CQA) Plan.

B. The Contractor shall be aware of the activities outlined in the CQA Plan and shall account for these activities in the construction schedule.

PART 2 PRODUCTS

2.1 MATERIAL FOR CLAY LINER

A. Material Soil Testing:
All laboratory testing to evaluate the suitability or conformance of soil materials for the liner shall be carried out in accordance with the test methods indicated in the Construction Quality Assurance (CQA) Plan.

B. The Completed liner:

The liner shall consist of one (1) foot relatively homogeneous, clay soil material which is free of organics, debris, foreign objects and native to the property.

C. Clay Liner Soil Testing:

Soil testing for the clay liner shall be as specified under the Construction Quality Assurance (CQA) Plan.

D. Target Compaction Criteria

Based on the data from the testing program described in the Construction Quality Assurance (CQA) Plan, the Construction Project Manager shall establish the minimum target compaction criteria for the field (the range of water contend of the liner material to be maintained during compaction and dry densities) that will likely achieve the hydraulic conductivity reguired. At a minimum, the Contractor will be required to compact the liner to a dry unit weight equal to at least 95% of the maximum dry unit weight determined from the standard Proctor compaction test (ASTM D 698), and within a specified range of water contents. Regardless of the minimum target compaction criteria, the Contractor shall achieve a hydraulic conductivity less than 1.0×10^{-7} cm/s for the clay liner.

PART 3 EXECUTION

3.1 FAMILIARIZATION

A. Prior to implementing any of the work of this Section, the Contractor shall become thoroughly familiar with the site, the site conditions and all portions of the work falling within this Section.

B. Inspection:

1. Prior to implementing any of the work of this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all such work is complete to the point where the work of this Section may properly commence without adverse impact.

2. If the Contractor has any concerns regarding the installed work of other Sections or the site, he should notify the Construction Project Manager in writing prior to installation of the liner. Failure to notify the Construction Project Manager prior to installation of the liner will be construed as Contractor acceptance of the related work of all other Sections.

3.2 FIELD QUALITY ASSURANCE

The Soils CQA Engineer will perform field quality assurance testing of all liner placement operations. The types and minimum frequencies of quality control testing for the liner shall be as outlined under the Construction Quality Assurance (CQA) Plan. Sampling locations will be selected by the Soils CQA Engineer. All perforations in the liner must be filled and defective areas corrected as specified under the Construction Quality Assurance (CQA) Plan.

3.3 CLAY LINER MATERIAL PLACEMENT

The clay liner material shall be as specified under the CQA program.

(END OF SECTION)

PART 1.0 - GENERAL

1.1 DESCRIPTION OF WORK

The Contractor shall furnish all labor, equipment, and materials necessary to place and compact the crushed gravel surface for the access road, the riprap for the side slopes and dikes and soil materials in accordance with the Engineering Drawings and Specifications.

1.2 RELATED SECTIONS

A. Engineering Drawings.

1.3 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) standards:

1. ASTM D 422 Standard Test Method for Particle Size Analysis of Solids.

2. ASTM D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^2 (600kN-m/m^3).

3. ASTM D 2434 Standard Test Method for Permeability of Granular Soils (Constant Head).

B. Kansas Department of Transportation (KDOT), *Materials Division's Specifications (latest edditon)*

C. National Crushed Stone Association (NCSA) – "*Quarried Stone for Erosion and Sediment Control*" guidelines.

PART 2.0 - PRODUCTS

2.1 MATERIAL

A. Rock used for riprap shall be hard durable, angular in shape, free from overburden, shale and organic matter and meet KDOT specifications for Plain Riprap Stone.

B. Rock used for Catchment Dike construction shall have 12" to 30" (average 15") stone size and shall be hard durable, angular in shape, free from overburden, shale and organic matter and meet NCSA's guidelines for Quarry Stone for Erosion and Sediment Control.

C. Filter stone for the Catchment Dike construction shall have 6.5" maximum (average 2.5") stone size and shall be hard durable, angular in shape, free from

overburden, shale and organic matter and meet NCSA's guidelines for Quarry Stone for Erosion and Sediment Control.

D. Crushed aggregate for the access road construction shall be crushed stone and meet KDOT specifications for "Crushed Stone for Backfill" as defined in Materials Division, Subsection 1115. Crushed aggregate shall be clean, tough, sound, durable rock and shall not contain harmful quantities of foreign materials.

E. Clean soil that will be used as fill material shall consist of relatively homogeneous clean soil material which is free of organics, debris and foreign objects. The clean soil fill shall be compacted to 90% Standard Proctor.

F. Clay soil for capping shall meet material and compaction specifications as specified in the Construction Quality Assurance program.

G. The vegetative soil layer shall be sufficient depth and quality to sustain vegetative growth. Soils exhibiting vegetative matter, grass roots, or other characteristics common to surface soils shall be deemed vegetative soil.

PART 3.0 - EXECUTION

3.1 INSTALLATION

A. The gravel for the the road shall be installed as shown on the Drawings and compacted to the specified lines, grades, cross sections, and depths shown on the Drawings.

B. The riprap shall be installed at the locations specified in the Drawings. Prior to installation of the riprap, all excavation, clay filling and shaping of the side slopes shall have been completed. The riprap shall be installed to the specified lines, grades, across sections, and depths shown in the Drawings.

C. Riprap and Filter stone installation for the construction of the Catchment Dike system shall be as shown in the Drawings.

D. The clay and clean soil fill material shall be installed in 6 inch compacted lifts and compacted. Fill material placed in water shall be excempt from the Standard Proctor compaction requirement. If compaction verification testing for clay is required it shall be done by Nuclear densometer method as specified in the Construction Quality Assurance Program

(END OF SECTION)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

The Contractor shall furnish all labor, materials, tools, supervision, transportation, installation equipment and incidentals required to apply seeding and fertilizing at all disturbed and construction areas as specified herein and as shown on the Drawings.

1.2 RELATED SECTIONS

A. Engineering Specifications Section 01010

1.3 PAYMENT AND MEASUREMENT

Seeding and fertilizing shall be paid for under lump sum contract unit bid prices, as part of the whole project.

1.4 REFERENCES

A. Construction Quality Assurance (CQA) Plan.

B. KDOT Specifications

1.5 SUBMITTALS

A. The Contractor shall submit the following to the Construction Project Manager for inspection and acceptance at least 15 days prior to starting the work of this Section:

1. Samples of proposed materials.

2. Manufacturer's product data and recommended methods of installation or application.

B. The Contractor may be required to supply a certification from the manufacturer or a testing laboratory as to the available nutrients contained in the proposed fertilizer.

1.6 CONSTRUCTION QUALITY ASSURANCE

At the discretion of the Construction Project Manager, the work of this Section may be subjected to CQA monitoring.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fertilizer shall be commercial grade fertilizer meeting the requirements of all State and Federal regulations and standards of the Association of Office Agricultural Chemists. Fertilizer shall be delivered to the site in original, properly labeled, unopened, clean containers each showing the manufacturer's guaranteed analysis conforming to applicable fertilizer regulations and standards. Fertilizer failing to meet the specified analysis may be used as determined by the Construction Project Manager providing sufficient materials are applied to comply with the specified nutrients per unit of measure without additional cost to the Owner.

B. Seed shall be mixtur of winter rye or Bermuda and labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall also comply with applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination, which date shall be within a period of 6 months prior to commencement of planting operations. No seed shall be used after its date of expiration..

PART 3 EXECUTION

3.1 FAMILIARIZATION

A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section and KDOT Specifications.

B. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this section may properly commence without adverse impact.

3.2 APPLICATION

A. For all areas to be seeded:

1. Fertilizer (10-20-10) shall be applied at the rate of 10 pounds per 1,000 square feet or as determined by the soil test.

2. Seed shall be applied at the rates specified by the manufacturer or Construction Project Manager.

(END OF SECTION)

CONSTRUCTION QUALITY ASSURANCE PROGRAM

ENGINEERING SPECIFICATIONS

TABLE OF CONTENTS

Section I	General
Section II	Soils Construction Quality Assurance

1. INTRODUCTION

This Construction Quality Assurance (CQA) Plan addresses the soils components of the construction and is divided into the following sections: Section I, General; and Section II, Soils CQA.

2. DEFINITIONS RELATING TO CONSTRUCTION QUALITY ASSURANCE

2.1 Construction Quality Assurance and Construction Quality Control

This CQA Plan is devoted to Construction Quality Assurance and to Construction Quality Control. In the context of this plan, Construction Quality Assurance and Construction Quality Control are defined as follows:

Construction Quality Assurance (CQA) - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service. The CQA Manager shall perform Construction Quality Assurance.

Construction Quality Control (CQC) - Actions that provide a means to measure and regulate the characteristics of an item or service to meet contractual and regulatory requirements.

2.2 Use of The Terms in This Plan

In the context of this document:

- **Construction Quality Assurance (CQA)** refers to means and actions employed by the Construction Quality Assurance Manager (CQA Manager) and testing laboratories to assure conformity of the clay liner construction with this CQA Plan, the drawings and the specifications. CQA is provided by a party independent from construction, under contract to the Owner.

- **Construction Quality Control (CQC)** refers to those actions taken by suppliers and contractor to ensure that the materials and the workmanship meet the requirements of the plans and specifications. In the case of soils components, CQC may be combined with CQA, which is provided by the Construction Project Manager. In the case of the geosynthetic and other non-soil components, CQC is provided by the manufacturers and installers of the various geosynthetics.

3. PARTIES TO CONSTRUCTION QUALITY ASSURANCE

3.1 Description of the Parties

3.1.1 Owner

The Owner owns, and/or is responsible for, the facility. In this CQA Plan, the "Owner" will refer specifically to United States Steel Corporation/Citigroup Global Market Holdings, Inc.

3.1.2 Design Engineer

The Design Engineer is responsible for the design, drawings, CQA Plan and Specifications. In this CQA Plan the term "Design Engineer" will refer specifically to A & M Engineering and Environmental Services, Inc.

3.1.3 Construction Project Manager

The Construction Project Manager, which may also be referred to hereinafter as "Project Manager", is responsible for overall job management and coordination. The Construction Project Manager is the official representative of the Contractor. The Construction Project Manager is responsible for the day-to-day coordination of work efforts and ensuring that all functions are performed properly and in such a manner as to expedite the completion of the project in the most timely manner. The Construction Project Manager shall be a Registered Professional Engineer in the State of Kansas.

3.1.4 Project Quality Assurance/Quality Control (QA/QC) Manager

The Project QA/QC Manager which may also be referred to hereinafter as "Project CQA Manager", is the representative of the Construction Contractor and is responsible for managing, coordinating and implementing the CQA activities and confirming that the CQC activities are performed in accordance with the Construction Drawings and Specifications for the compacted clay cap.

3.1.5 Construction Inspection Manager

The Construction Inspection Manager, which may also be referred to hereinafter as "Owner Inspection Manager" is the designated representative of the Owner. The Construction Inspection Manager is responsible for confirming that the construction activities are performed in accordance with the drawings, specifications and the CQA Plan.

3.1.6 Construction Contractor

The Construction Contractor is responsible for excavating, hauling, backfilling, compacting and grading soil and riprap materials for the Landfill Closure and construction of drainage swales, ditches, sediment traps; and all other earthworks as shown in the Drawings or described in the Technical Specifications document.

3.1.7 Soils Construction Quality Assurance Engineer

The Soils CQA Engineer is the CQA Manager's designated representative and is responsible for observing field testing and documenting activities related to the CQA of the earthworks at the site and issuing a CQA report.

3.1.8 Soils Construction Quality Assurance Laboratory

The Soils CQA Laboratory is the representative of the Construction Contractor and is responsible for conducting tests in the laboratory on samples of soil taken from borrow pits, stockpiles or the liner subbase system.

3.1.9 Health and Safety Manager

The Health and Safety Manager ensures that the Site-Specific Health and Safety Plan meets all requirements of Contractor's Health and Safety Program; OSHA Regulations 29 CFR 1910.120, 29 CFR 1926 and all 49 CFR transportation requirements; and all IMCO Recycling Inc. Health and Safety requirements.

3.1.10 Site Health and Safety Officer

The Site Health and Safety Officer will be responsible for overseeing that the Site-Specific Health and Safety Plan and all other applicable regulations are being followed at the job site. This is the Contractor's Site Health and Safety Officer.

3.1.11 Construction Supervisor

The Construction Supervisor reports to and is the designated field representative of the Project Manager. He is responsible for the construction activities and confirming that the activities are performed in accordance with the drawings and specifications and the CQA Plan. He is responsible for the day-to-day coordination of work efforts.

3.2 Qualifications of the Parties

The following qualifications are required of all parties involved with the design, construction, and CQA of all liner systems and materials.

3.2.1 Construction Project Manager

The Construction Project Manager shall be a Registered Professional Engineer in the State of Kansas and have a work history, which demonstrates familiarity with clay liner installation components, including detailed design methods and procedures.

3.2.2 Construction Contractor

Qualifications of the Construction Contractor are specific to the construction contract. The Construction Contractor will have a demonstrated history of successful roadway, landfill and earthworks construction.

3.2.3 Soils Construction Quality Assurance Laboratory

The Soils CQA Laboratory will have experience in testing soils, meet all regulatory requirements and be familiar with ASTM and other applicable standards. The Soils CQA Laboratory will be capable of providing test results in accordance with the specifications.

4. SCOPE OF CONSTRUCTION QUALITY ASSURANCE

The scope of this CQA Plan includes the CQA of the subgrade and all soils components of the Project. The CQC of the selection, evaluation and placement of the soils is included in the scope.

5. UNITS

In this CQA Plan, all properties and dimensions are expressed in U.S. customary units with SI units in parentheses. It should be noted that the conversion is typically only accurate within ten percent, due to rounding. In cases of conflict or clarification, the U.S. units will be deemed to govern.

6. REFERENCES

The CQA Plan includes references to test procedures of the American Society for Testing and Materials (ASTM), the Federal Test Method Standards (FTMS), and The American Association of State Highway and Transportation Officials (AASHTO).

7. SITE AND PROJECT CONTROL

7.1 Project Coordination Meetings

To guarantee a high degree of quality during construction, clear open channels of communication are essential. To that end, meetings are critical.

7.1.1 Pre-Construction Meeting

A Pre-Construction Meeting will be held at the site. At a minimum, the meeting will be attended by the Owner, Design Engineer, the Construction Contractor, the Construction CQA Manager, the Construction Project Manager, Construction Inspection Manager and Regulatory Inspectors.

Specific topics considered for this meeting include:

- Review the responsibilities of each party;
- Review lines of authority and communication;
- Establish work area security and safety protocol;
- Review methods for documenting and reporting and for distributing documents and reports;
- Communicate to all parties any change in the project documents;
- Review critical design details of the project;
- Establish protocols for testing;
- Establish protocols or handling deficiencies, repairs and retesting;
- Review the time schedule for all operations;
- Conduct a site walk-around to familiarize personnel with site field conditions and to review material storage locations; and
- Establish material stockpile locations.

A person designated at the beginning of the meeting will document the meeting and

transmit the minutes to all parties.

7.1.2 Progress Meetings

A weekly progress meeting will be held between the Construction Contractor, the Project Manager, the Construction Inspection Manager, and any other concerned parties. This meeting will discuss the current progress of the project, planned activities for the next week and any new business or revisions to the work. The Project Manager will log any problems, decisions or questions arising at this meeting in the daily reports. A person designated at the beginning of the meeting will document the meeting and minutes will be transmitted to all parties.

7.1.3 Problem or Work Deficiency Meeting

A special meeting will be held when and if a problem or deficiency is present or likely to occur. At a minimum, the meeting will be attended by the contractor and the Construction Project Manager. If the problem requires a design modification, the Design Engineer will also be present. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternative solutions; and
- Implement an action plan to resolve the problem or deficiency.

A person designated at the meeting will document the meeting and minutes will be transmitted to affected parties.

1. INTRODUCTION

This section of the CQA Plan addresses the soils components of the landfill clay cap and outlines the soils CQA program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

2. SOIL COMPONENT

2.1 General

The Soils CQA Engineer will review the Contractor's submittals for each proposed source and confirm to the Contractor each approved source. The Soil CQA Engineer will perform field quality control testing during soil placement.

2.2 Clay Cap

The clay cap will consist of relatively 12 inches of homogeneous, natural clay soils that are free of debris, foreign objects, excess silt, roots and organics and 6 inches of vegetative topsoil. Clay cap will not contain any particles larger than 1.0 in. (25 mm). Regardless of the classification requirements, the clay material must achieve a hydraulic conductivity of 1×10^{-7} cm/s or less, as determined in ASTM D 5084. In addition:

- The hydraulic conductivity tests will be performed using a flexible wall permeameter that can apply cell pressure and backpressure (e.g., triaxial cell).
- The hydraulic conductivity tests will be conducted at an effective confining stress of 3,000 psf (144 kPa).

The Soils CQA Engineer will review all the testing documentation for the clay material and will report any nonconformance with the Specifications to the Project Manager.

The Contractor will notify the Project Manager in writing at least seven (7) days in advance of its intention to perform the work on the clay cap. Prior to starting this work, the Contractor will notify the Project Manager that all other related work that may affect the construction of the clay cap has been completed satisfactorily.

The Contractor will construct the clay cap to the grades, slopes and elevations shown on the Construction Drawings and in accordance with the Specifications. The final thickness of the clay cap must be within 0 to plus 0.2 ft (0.06 m) of the specified thickness.

The clay material will be spread and compacted in lifts that, on average, will not exceed 6 in.

(150 mm) after compaction. Each lift will be compacted to the required minimum dry density within the range of moisture contents established by pre-qualification tests. The dry density and moisture content of the clay will be used only as an indicator of the degree of compaction. Acceptance will be based on laboratory hydraulic conductivity test results. No clay material will be placed over a lift which has not been compacted to at least 95 percent of the maximum dry unit weight determined from the standard Proctor compaction test (ASTM D 698) and within the range of acceptable moisture contents.

The soil used for the clay cap will not be frozen at the time of placement nor will it be placed on frozen or thawing material.

The Contractor will maintain the construction site to promote good drainage.

The working area will be graded and then rolled with a smooth wheel roller at the end of each construction day to remove all ruts and indentations and to aid runoff and drainage of the work area. These smooth surfaces will be scarified before placement of additional fill. No material will be placed in standing water or on saturated material or during precipitation.

Hand compaction at the proper moisture content will be used in all places around penetrations, corners, appurtenances, etc., in order to achieve the specified dry density and moisture content. Bentonite powder will be placed around pipes and appurtenances, if deemed necessary by the Design Engineer. Care will be taken to protect other structures. Damage to any materials or work caused by hand compaction will be replaced by the Contractor at no additional cost to the Owner.

The Contractor must take quality assurance testing into account when planning his construction schedule. The Soils CQA Engineer will conduct moisture, density, thickness and hydraulic conductivity tests during construction of the clay cap.

A special testing frequency of installed clay cap will be used at the discretion of the Project Manager and/or the Soils CQA Engineer when visual observations of construction performance indicate a potential problem. Additional testing for suspected areas will be considered when the rollers slip during rolling operation, the lift thickness is greater than required, the clay cap is at improper and/or variable moisture content, fewer than the specified number of roller passes are made, dirt-clogged rollers are used to compact the material, the rollers may not have used optimum ballast, or the degree of compaction is doubtful.

During construction, the frequency of testing may also be increased during adverse weather conditions, if equipment breaks down, at the start and finish of grading, if the material fails to meet specifications, or the work area is reduced.

All holes in the clay cap from nuclear density test probe locations, hydraulic conductivity sampling locations, and test pit (if deemed necessary, to evaluate clay cap layer bonding) locations will be backfilled by the Contractor with a bentonite slurry/powder or soil-bentonite mixture to the satisfaction of the Soils CQA Engineer.

If a defective area is discovered in the clay cap, the Soils CQA Engineer will determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Soils CQA Engineer will determine the extent of the defective area by additional tests, observations, a review of records, or other means that the Soils CQA Engineer deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Soils CQA Engineer will define the limits and nature of the defect by testing or observation. After the extent and nature of a defect is determined, the Contractor will correct the deficiency to the satisfaction of the Soils CQA Engineer. The cost of corrective actions will be borne by the Contractor. Additional testing will be performed to verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency.

The Contractor will use all means necessary to protect all prior work, as well as all materials and completed work of other Sections. In the event of damage, the Contractor will immediately make all repairs and replacements necessary to the approval of the Soils CQA Engineer at no additional cost to the Owner.

3. SOILS TESTING

3.1 Test Methods

All testing used to evaluate the suitability or conformance of soils materials will be carried out in accordance with the current versions of the corresponding American Society for Testing and Materials (ASTM) test procedures except as noted herein. The test methods indicated in Table II-1 are those that will be used for this soils CQA program.

3.2 Soils Testing Requirements

Nuclear densometer methods will be used for the field density testing in all cases. Dry-Cylinder tests method will be used in cases of uncertainty or as a check. The Soils CQA Engineer will resolve any conflict over the test results.

The frequency of soils testing for materials evaluation will conform to the minimum frequencies presented in Table II-2. The Soils CQA Engineer taking into consideration the

natural variability of materials will determine the actual frequency of testing required.

The frequency of soils testing for Construction Quality Control purposes will conform to the minimum frequencies presented in Table II-3. The Soils CQA Engineer taking into consideration the natural variability of materials will determine the actual frequency of testing required.

3.3 Testing For Clean Soil

The clay, backfill soil, and topsoil to be supplied by the Contractor for this project must be certified as "Clean Soil" by the Construction Project Manager and accepted by the Owners and their representative Construction Inspection Manager. Clean soil certification will be based on the background concentrations of the elements (Total Zinc, Lead, Cadmium, Chromium and Arsenic) and TPH.

Sampling requirements for certification will be As follows:

Initial one (1) sample will be taken from the location of clay, backfill, and topsoil sources designated for the project. After the first 50,000 C.Y. one (1) sample will be taken from each 50,000 C.Y. of each type of borrow material. All samples will be analyzed for TPH, Total Zinc, Lead, Cadmium, Chromium and Arsenic by a laboratory certified by KDHE.

TABLE II-1
TEST PROCEDURES FOR THE EVALUATION OF SOILS

TEST METHOD	PASSING CRITERIA	TEST STANDARD
Laboratory Test Procedures:		
Soil Classification	CL, CH or SC	ASTM D 2487
Moisture Content	Above OMC as determined by ASTM D 698	ASTM D 2216
Standard Proctor (Laboratory Compaction)	Minimum 95% Standard Proctor maximum dry density	ASTM D 698
Atterberg Limits	Plasticity Index greater than 10	ASTM D 4318
Sieve Analysis (Hydrometer Analysis)	More than 80% passing No.4 sieve and more than 30% passing No. 200 sieve. Maximum particle size 2 inch.	ASTM D 422
Sieve Analysis	Particle size range ¾ - 2 ½ inch, No more than 5% smaller than ¾ or larger than 2 ½ inch size.	ASTM C 136
Permeability (Flexible Wall Permeameter)	$1X\ 10^{-7}$ cm/sec or less	ASTM D 5084
Permeability (Rigid Wall Permeameter)	Greater than $1X\ 10^{-2}$ cm/sec.	ASTM D 2434
TPH and Elements for Clean Soil	TPH Total Zinc, Lead, Cadmium, Chromium & Arsenic	SW-8015M SW-6010A
Field Test Procedures:		
Classification	CL, CH or SC	ASTM D 2488
Nuclear Densometer	Minimum 95% of Standard Proctor (90% of Modified Proctor) maximum dry density at or up to 5% above OMC as determined by ASTM D 698 (ASTM D 1557 For Modified Proctor).	ASTM D 2922 ASTM D 3017
Dry-Cylinder Method	Minimum 95% of Standard Proctor (90% of Modified Proctor) maximum dry density at or up to 5% above OMC as determined by ASTM D 698 (ASTM D 1557 For Modified Proctor).	ASTM D 2937

TABLE II-2

MINIMUM TESTING FREQUENCIES
FOR MATERIALS EVALUATION (CONFORMANCE) OF CLAY CAP
AND CLEAN SOIL MATERIALS

TEST	COMPACTED SUBGRADE, CLEAN SOIL, CLAY CAP, PREPARED BASE	SUMP AND PIPE BEDDING GRAVEL AND PROTECTIVE SOIL COVER
Moisture Content	1 per 10,000 yd^3 (8,000 m^3) (Minimum 1 per source)	N/A
Hydrometer Analysis (1)	1 per 10,000 yd^3 (8,000 m^3) (Minimum 1 per source)	N/A
Sieve Analysis	1 per 10,000 yd^3 (8,000 m^3) (Minimum 1 per source)	1 per 1,000 yd^3 (800 m^3) (Minimum 1 per source)
Atterberg Limits	1 per 10,000 yd^3 (8,000 m^3) (Minimum 1 per source)	N/A
Standard Proctor(2)	1 per 10,000 yd^3 (8,000 m^3) (Minimum 1 per source)	N/A
Hydraulic Conductivity(3)	1 per 10,000 yd3 (8,000 m^3) (Minimum 1 per source)	1 per 5,000 yd^3 (4,000 m^3) (Minimum 1 per source)
TPH and Elements for Clean Soil	One (1) test at the Beginning and one (1) test for every 50,000 C.Y. after the first 50,000 C.Y.	

NOTES:

(1) The hydrometer tests will only be performed on soils with 5 percent or more particles passing the No. 200 sieve.

(2) The Standard Proctor test will only be performed on soils with more than 12 percent particles passing the No. 200 sieve.

(3) The hydraulic conductivity test will not be performed on the subgrade or embankment fill. Sump and pipe bedding gravel may require testing if requested by the Design Engineer.

TABLE II-3

MINIMUM TESTING FREQUENCIES
FOR CONSTRUCTION QUALITY CONTROL OF SOILS

TEST	COMPACTED SUBGRADE, CLAY CAP, EMBANKMENT FILL, LINER SUBBASE
In-Situ Moisture Content	3 per acre per lift
In-Situ Density	3 per acre per lift
Laboratory Hydraulic Conductivity [1]	1 per acre per lift

NOTES: [1] The hydraulic conductivity test will be performed on Shelby tube samples obtained from liner subbase.

4. SOILS CONSTRUCTION QUALITY ASSURANCE

Construction evaluation testing will consist of: (1) monitoring the work; (2) investigations into the adequacy of clay cap layer bonding; and (3) laboratory and field tests. All laboratory tests should be conducted on samples taken at the borrow source and/or stockpile, prior to construction. All field tests will be conducted during the course of the work.

4.1 Monitoring

The CQA Engineer will monitor and document the construction of clay cap soils components. Monitoring includes the following:

- Testing to determine the moisture content and other physical properties during processing, placement and compaction,
- Monitoring the thickness of lifts as loosely placed and as compacted,
- Monitoring the action of the compaction and heavy hauling equipment on the construction surface (i.e., penetration, pumping, cracking, etc.), and

- Monitoring the number of passes used to compact each lift.

4.2 Evaluation of Layer Bonding

Evaluation of clay cap layer bonding may be determined by using randomly located test pits at a rate of two (2) pits per acre to make visual observations. All test pits will be excavated in a manner acceptable to the Soils CQA Manager. Test pits will be at least 1 ft (300 mm) in depth. All pits will be backfilled and compacted in accordance with the project specifications. The backfill will be compacted using hand compaction equipment or other methods approved by the Soils CQA Manager.

4.3 Laboratory and Field Tests

The laboratory and field test methods and testing frequencies presented in Tables II-1 through II-3 will apply.

At locations where the clay cap field-testing indicates densities or moisture content below the requirements of the specification, the failing area will be reworked. Reworking includes scarifying the area, adjusting the moisture content and re-compacting. Alternately, at the Soils CQA Manager and Project Manager's option, undisturbed samples of in-place material may be obtained and hydraulic conductivity tests conducted. The Engineer may waive the density requirements if the hydraulic conductivity tests reveal acceptable results.

Hydraulic conductivity evaluations will be conducted on materials proposed for the clay cap. Hydraulic conductivity evaluations will be performed in the laboratory on the following:

- Samples of the materials for clay cap obtained from the borrow source and/or stockpile, for materials selection, and

- Undisturbed samples obtained from the clay cap during its construction; these samples will be taken in the vicinity of a field density test location.

Criteria to be used for determination of acceptability will be as identified in this document and in the Specifications. Where undisturbed samples for laboratory testing cannot be obtained, in situ field-testing of soil permeability will be conducted using a field permeameter of a type approved by the Engineer. Other tests conducted on permeability samples will consist of liquid and plastic limits and particle size analyses.

4.4 Construction Quality Assurance Testing Frequency

All Construction Quality Control testing will be conducted in accordance with the Specifications or as directed by the Engineer. The Soils CQA Engineer will observe testing

methods, as previously identified, and document and report all test results.

Pre-construction testing will be conducted on material samples obtained from borrow sources and stockpiles. Pre-construction testing will consist of material evaluation tests as described in Section 4.3. Construction Quality Control and Assurance testing will also be conducted on samples of placed material during the courses of the work.

Routine testing frequencies for material evaluation and construction quality evaluation are presented in Tables II-1 to II-3.

The Soils CQA Engineer will select sampling locations. If necessary, the location of routine in-place density tests will be determined using a non-biased sampling plan.

A special testing frequency will be used at the discretion of the Soils CQA Engineer when visual observations of construction performance indicate a potential problem. Additional testing for suspected areas will be considered when:

- The rollers slip during rolling operation,
- The lift thickness is greater than specified,
- The fill material is at improper and/or variable moisture content,
- Fewer than the specified number of roller passes are made,
- Dirt-clogged rollers are used to compact the material,
- The rollers may not have used optimum ballast,
- The fill materials differ substantially from those specified,
- The degree of compaction is doubtful, or
- As directed by the Project Manager.

During construction, the frequency of testing may also be increased in the following situations:

- Adverse weather conditions,
- Breakdown of equipment,

- At the start and finish of grading,
- If the material fails to meet specifications, or
- The work area is reduced.

4.5 Perforations

Perforations that must be filled will include, but not be limited to, the following:

- Nuclear density test probe locations,
- Hydraulic conductivity sampling locations, and
- Test pit locations.

Hydraulic conductivity samples will be taken such that the sample tube is inserted into the soil normal (perpendicular) to the plane of the constructed surface.

Unless otherwise noted in the project specifications, or as directed by the Engineer, all perforations of the clay cap by probe or sample tube will be backfilled with a minimum of ten percent bentonite powder mixture. The mixture will be compacted in-place with a tamping rod, hammer or hand tamper, depending on the size of the perforation. Test pit excavations will be backfilled with the same material being tested or examined.

4.6 Deficiencies

If a defect is discovered in the earthwork product, the Soils CQA Manager will immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Soils CQA Manager will determine the extent of the deficient area by additional tests, observations, a review of records or other means that the Soils CQA Manager deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Design Engineer will define the limits and nature of the defect. The Design Engineer may delegate the responsibilities to the Soils CQA Manager.

4.6.1 Notification

After determining the extent and nature of a defect, the Soils CQA Manager will notify the Owner and Construction Contractor and schedule appropriate retests when the work deficiency is to be corrected.

4.6.2 Repairs and Retesting

The Construction Contractor will correct the deficiency to the satisfaction of the Soils CQA Manager. If a project specification criterion cannot be met, or unusual weather conditions hinder work, then the Soils CQA Manager will develop and present to the Engineer and/or Project Manager suggested solutions for his approval.

All retests recommended by the Soils CQA Manager must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The Soils CQA Manager will also verify that all installation requirements are met and that all submittals are provided.

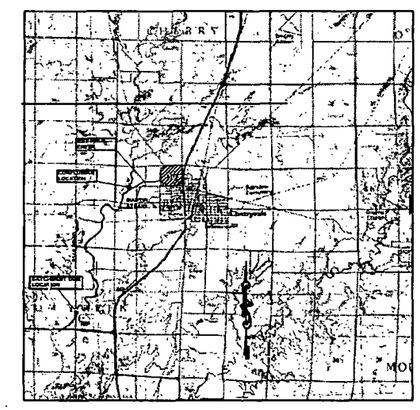
ENGINEERING AND CONSTRUCTION DRAWINGS

FORMER NATIONAL ZINC SITE

INCLUDING DRUM CREEK AND UNNAMED CREEK REMEDIATION
CHERRYVALE, KANSAS
JUNE 2006

DRAWING INDEX

SHEET NO.	DRAWING TITLE
1	COVER SHEET AND SITE VICINITY MAP
2	ENTRANCE AREAS AND SERVICE/ACCESS ROAD SYSTEM
3	ON-SITE DISPOSAL AREA SITE PLAN
4	ON-SITE DISPOSAL AREA CROSS-SECTIONS
5	UNNAMED CREEK SITE LOCATION MAP
6	DRUM CREEK AND UNNAMED CREEK CONFLUENCE REMEDIATION AREA
7	TYPICAL DETAILS SEDIMENT CATCHMENT DIKES
8	TYPICAL DETAILS SEDIMENT TRAP, DRAINAGE DITCH AND RIPRAP
9	TYPICAL DETAILS STAGING AREA
10	TYPICAL DETAILS CHAIN LINK FENCE



VICINITY MAP
MAP CENTER IS 37 15 18 N, 95 35 11 W (NAD27)
CHERRYVALE QUADRANGLE
CHERRYVALE, KANSAS
PROJECTION IS UTM ZONE 15 NAD83 DATUM
7.5 MINUTE SERIES (TOPOGRAPHIC)

NORTH

ALTAY M. ERTUGRUL
LICENSED
03/08/07
NO. 10479
KANSAS
PROFESSIONAL ENGINEER

PREPARED BY

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

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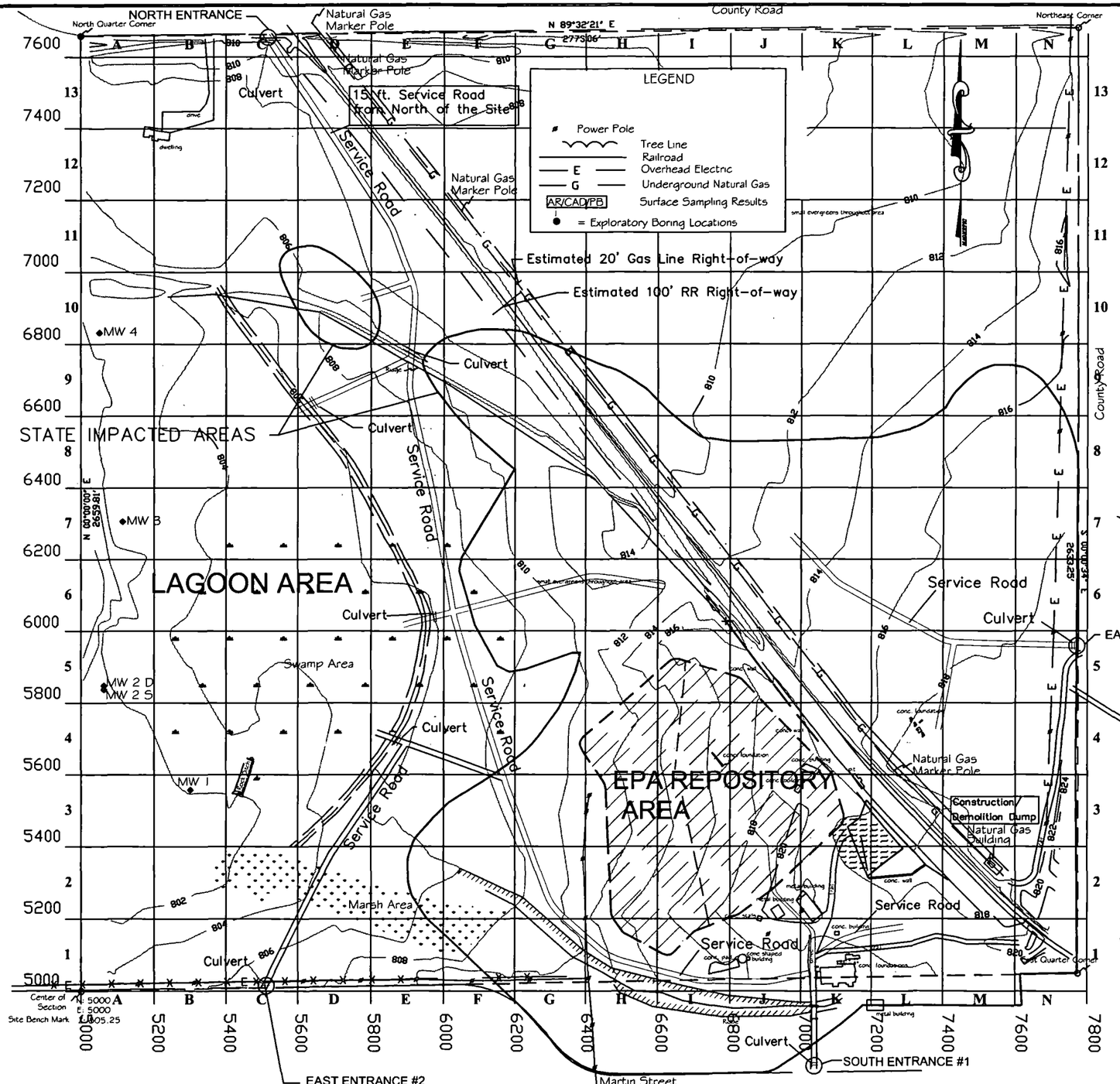

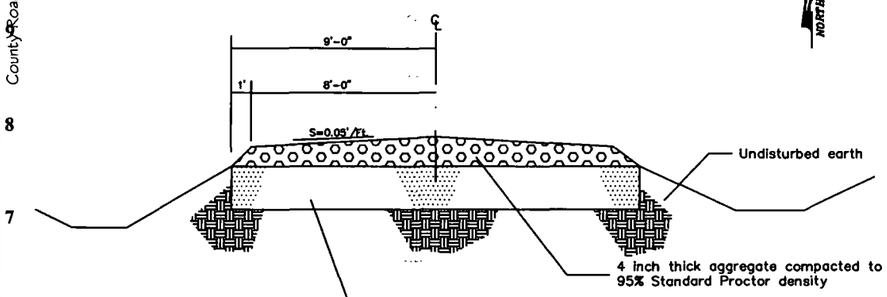

COMPACTED GRAVEL SERVICE/ACCESS ROAD

TYPICAL
NTS

NOTE:
1. Transportation of Material to the disposal area from the North side of the RR will be through the North Entrance.
2. Additional Service/Access Roads will be constructed as needed.

GRAPHIC SCALE

(IN FEET)
1 inch = 150 ft.

ALTAY M. ERTUGRUL
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03/08/06
NO. 10479
KANSAS
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GENERAL NOTES

REVISIONS

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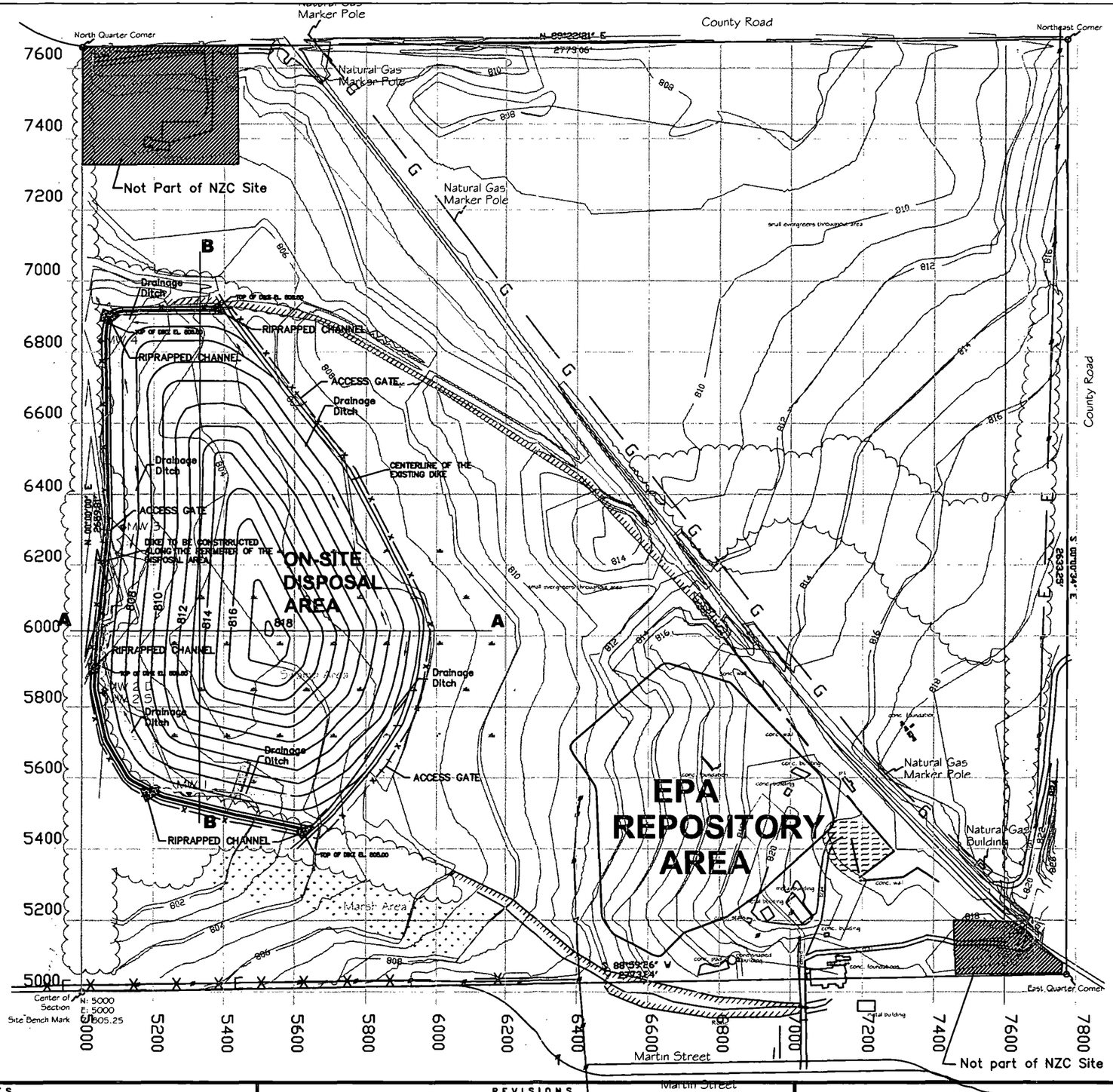
DATE: 4-27-2006	DATE: 4-27-2006	DATE:	DATE: 4-27-2006	DATE: 4-27-2006				

ENTRANCE AREAS AND SERVICE/ACCESS ROAD SYSTEM

FORMER NATIONAL ZINC SITE

CHERRYVALE, KANSAS



GRAPHIC SCALE

(IN FEET)
1 inch = 150 ft.

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ON-SITE DISPOSAL AREA PLAN

FORMER NATIONAL ZINC SITE

CHERRYVALE, KANSAS

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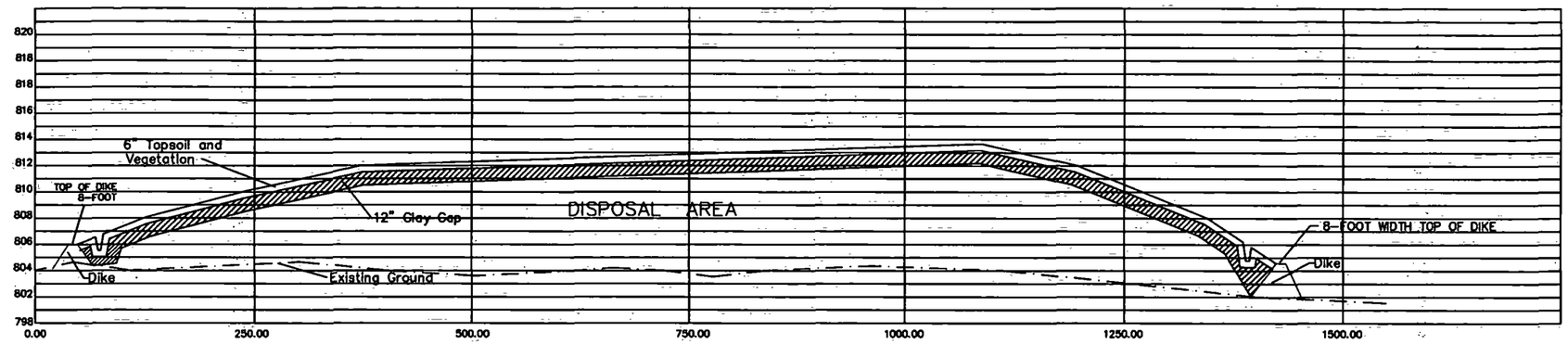
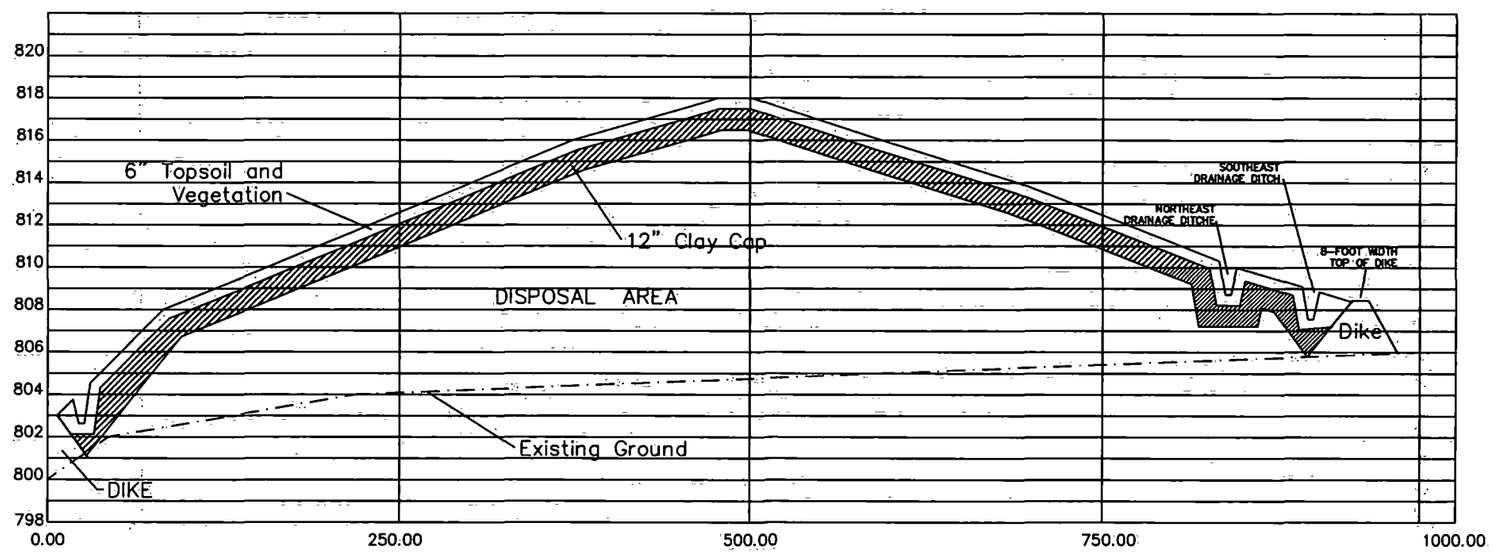
DATE: 4-27-2006	DATE: 4-27-2006	DATE:	DATE: 4-27-2006	DATE: 4-27-2006				



CROSSECTION B – B



CROSSECTION A – A

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NO.	DESCRIPTION	BY	CHECKED	DATE	NO.	DESCRIPTION	BY	CHECKED	DATE
1	Ditch Clarification (Section A–A)	OME	AME	3/1/2007					

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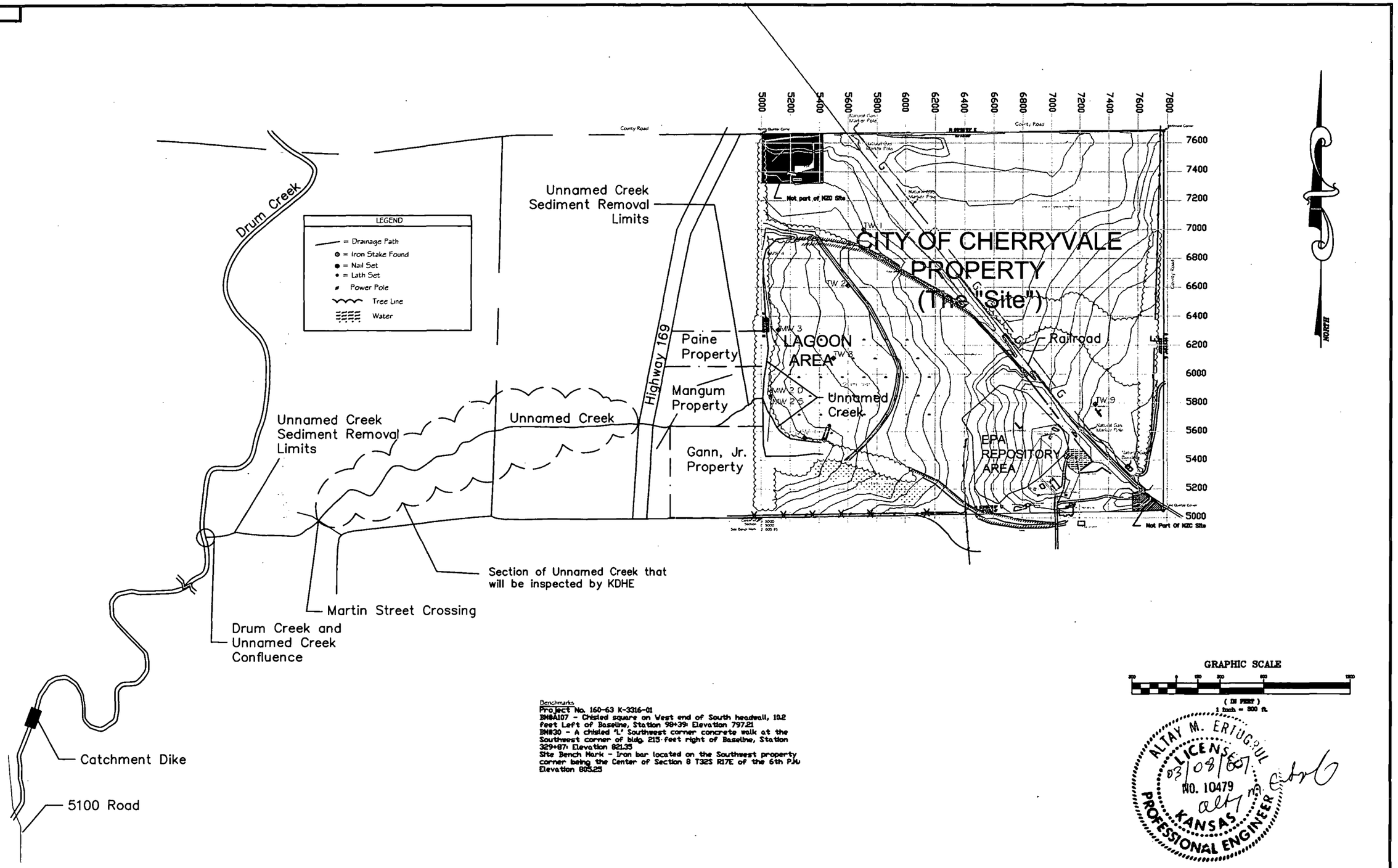
DATE: 4–30–2006	DATE: 4–30–2006	DATE:	DATE: 4–30–2006

ON-SITE DISPOSAL AREA CROSS-SECTIONS

FORMER NATIONAL ZINC SITE

CHERRYVALE, KANSAS

APPROVED BY: TME	SCALE:	PROJECT NUMBER:	DRAWING NUMBER:	REV.:
DATE: 4–30–2006	GRAPHIC	1804–003	SHEET NO. 4	



Benchmarks
Project No. 160-63 K-3316-01
BM8A107 - Chisled square on West end of South headwall, 10.2 feet Left of Baseline, Station 98+39. Elevation 797.21
BM830 - A chisled "L" Southwest corner concrete walk at the Southwest corner of bldg. 215 feet right of Baseline, Station 329+87. Elevation 821.35
Site Bench Mark - Iron bar located on the Southwest property corner being the Center of Section 8 T32S R17E of the 6th P.M. Elevation 805.25

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GENERAL NOTES

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DATE: 4-27-2006	DATE: 4-27-2006	DATE:	DATE: 4-27-2006

UNNAMED CREEK SITE LOCATION MAP

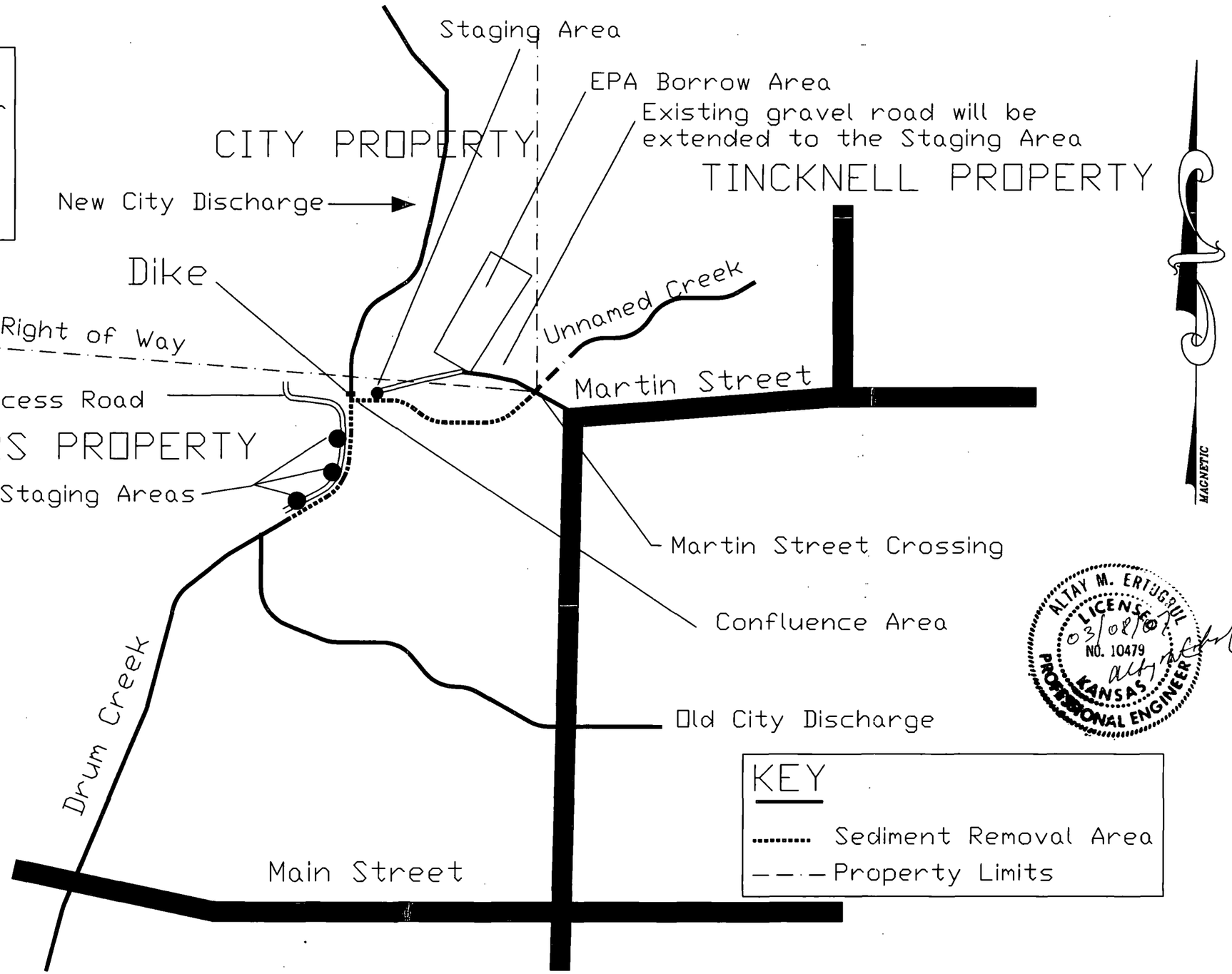
FORMER NATIONAL ZINC SITE

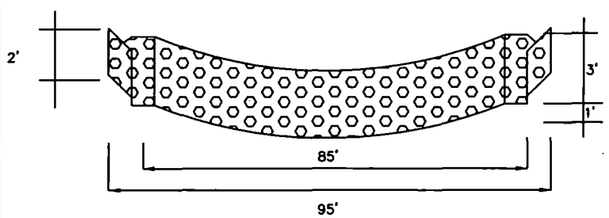
CHERRYVALE, KANSAS

APPROVED BY: TME	SCALE: 1"=300'	PROJECT NUMBER: 1804-003	DRAWING NUMBER: SHEET NO. 5	REV.:
DATE: 4-27-2006				

NOTES:

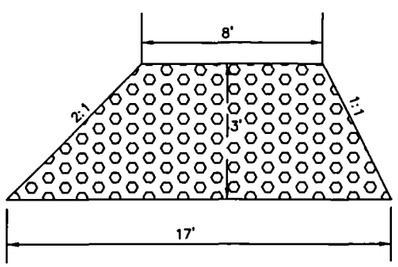
Staging areas will have liner and proper drainage to contain excavated sediments





DIKE PLAN

Scale: As Noted



DIKE CROSS-SECTION

Scale: As Noted

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GENERAL NOTES

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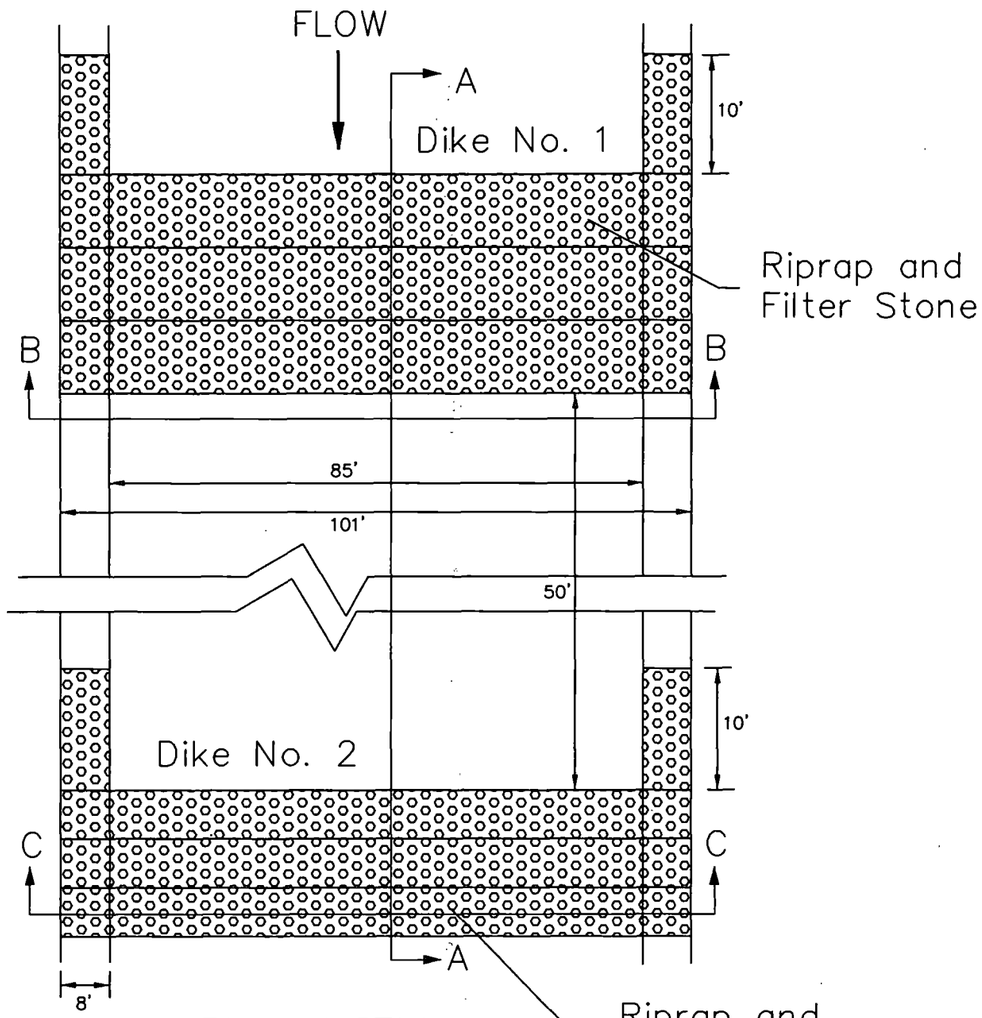
DATE: 4-30-2006	DATE: 4-30-2006	DATE:	DATE: 4-30-2006

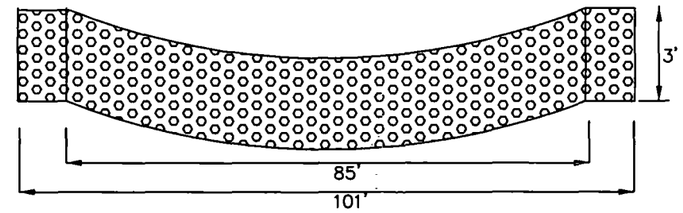
DRUM CREEK AND UNNAMED CREEK CONFLUENCE REMEDIATION AREA
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS

APPROVED BY: TME	SCALE:	PROJECT NUMBER:	DRAWING NUMBER:	REV.:
DATE: 4-30-2006	N.T.S.	1804-003	SHEET NO. 6	



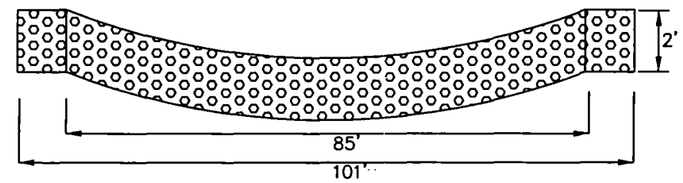
PLAN VIEW

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



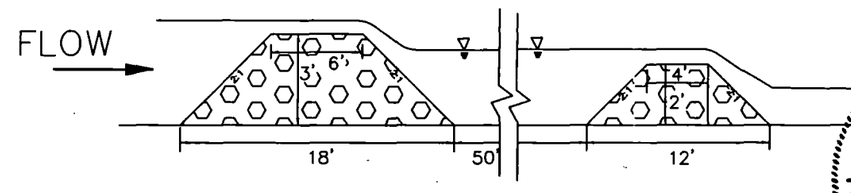
SECTION B-B

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'

ALTAY M. ERTUGRUL
LICENSE
03/09/07
NO. 10479
A.M.E.
KANSAS
PROFESSIONAL ENGINEER

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 shall be placed to the bottom of the dikes to prevent washing out of the banks and bottom materials.

GENERAL NOTES

REVISIONS

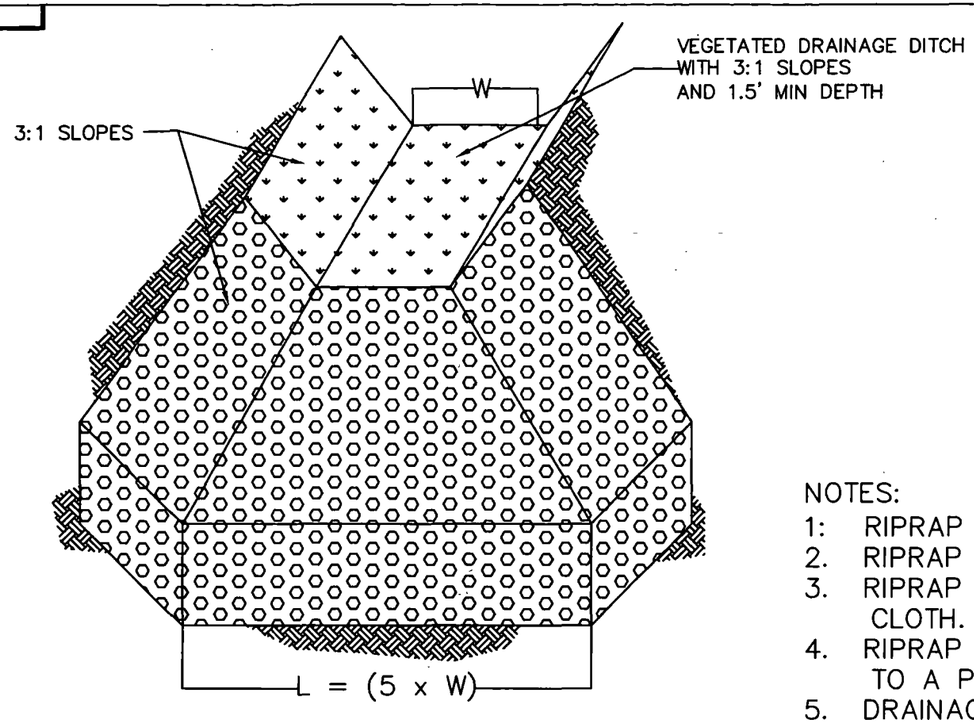
NO.	DESCRIPTION	BY	CHECKED	DATE	NO.	DESCRIPTION	BY	CHECKED	DATE

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

DRAWN: ALB	CHECKED BY: TME	MATERIALS BY:	ENGINEER: ALB	APPROVED BY: TME	SCALE:	PROJECT NUMBER:	DRAWING NUMBER:	REV.:
DATE: 4-30-2006	DATE: 4-30-2006	DATE:	DATE: 4-30-2006	DATE: 4-30-2006	GRAPHIC	1804-003	SHEET NO. 7	

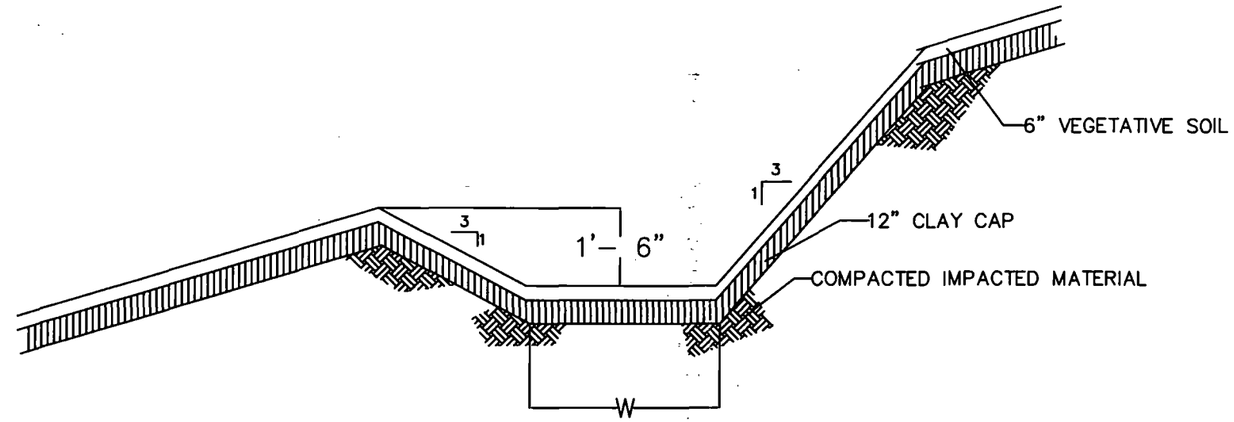
TYPICAL DETAILS
SEDIMENT CATCHMENT DIKES
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS



TYPICAL
RIPRAP AREA DETAIL

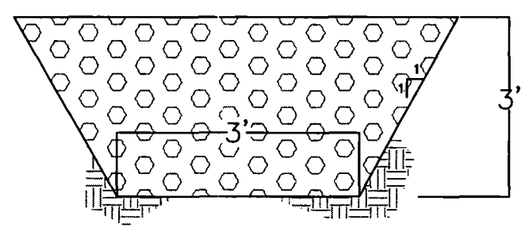
SCALE: NTS

NOTES:
1: RIPRAP STONE SIZE SHALL BE 4" – 12".
2. RIPRAP SLOPES SHALL BE 3:1.
3. RIPRAP SHALL BE PLACED OVER FILTER CLOTH.
4. RIPRAP AREA SHALL BE CONSTRUCTED TO A POINT TO CLEAR DIKE SLOPES.
5. DRAINAGE WIDTH SHALL BE AS SPECIFIED IN THE DRAWINGS WITH A DEPTH OF 1'–6" MINIMUM.



TYPICAL
DRAINAGE DITCH DETAIL

SCALE: NTS



TYPICAL
SEDIMENT TRAP

SCALE: NTS

NOTES:
Construction and operation of the Sediment traps will be based on the guidelines provided under Section V – Storm Water Management Plan.

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GENERAL NOTES

REVISIONS

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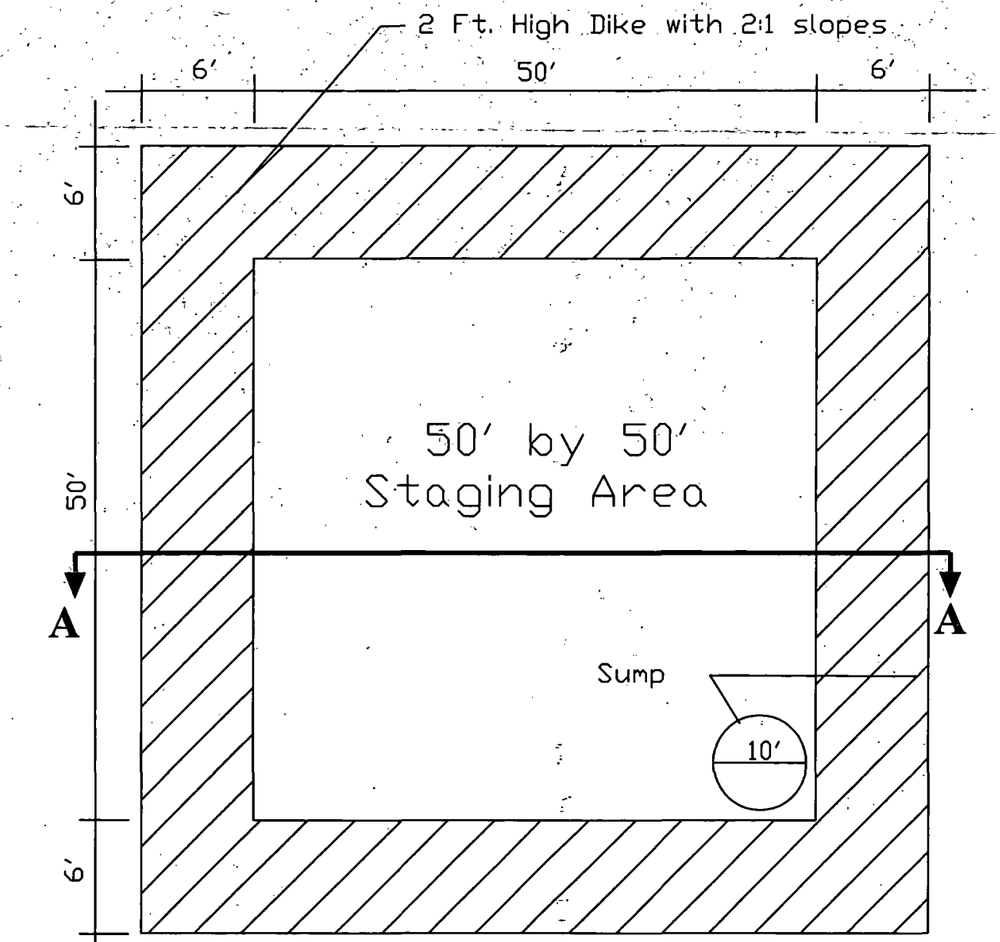
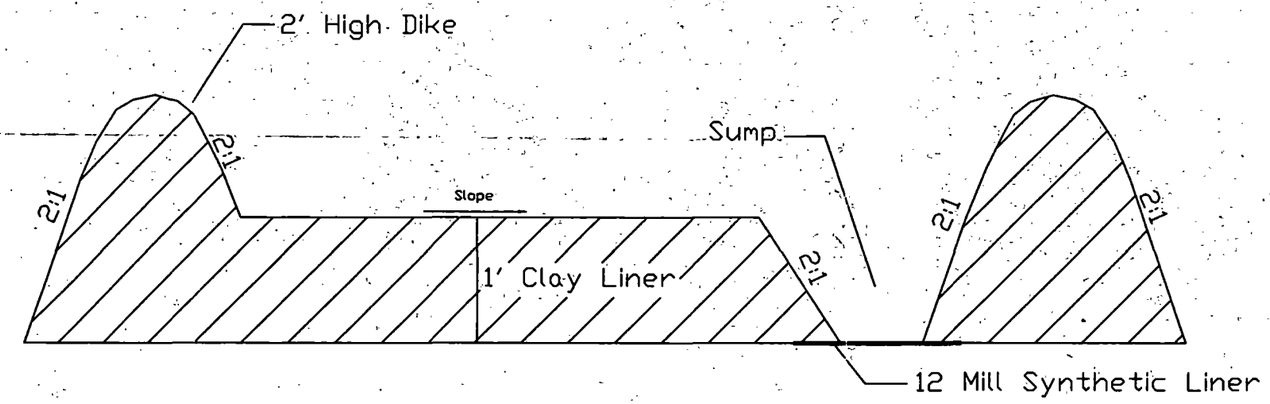
A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

TYPICAL DETAILS
SEDIMENT TRAP, DRAINAGE DITCH AND RIPRAP
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS

DRAWN: ALB	CHECKED BY: TME	MATERIALS BY:	ENGINEER: ALB	APPROVED BY: TME	SCALE:	PROJECT NUMBER:	DRAWING NUMBER:	REV.:
DATE: 4–30–2006	DATE: 4–30–2006	DATE:	DATE: 4–30–2006	DATE: 4–30–2006	GRAPHIC	1804–003	SHEET NO. 8	



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 Areas will be contained in Sumps and pumped back into the Creek.

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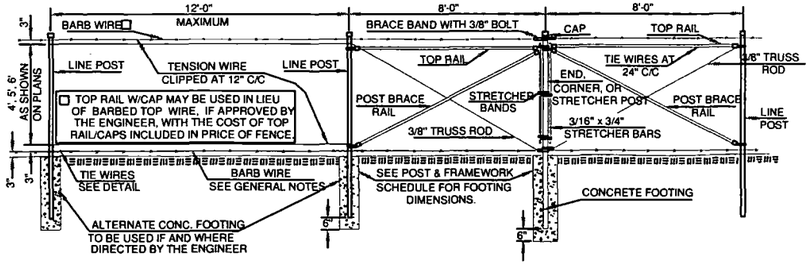
A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

TYPICAL DETAILS
STAGING AREA
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS

DRAWN: OME	CHECKED BY:	MATERIALS BY:	ENGINEER: OME	APPROVED BY: AME	SCALE:	PROJECT NUMBER:	DRAWING NUMBER:	REV.:
DATE: 6-12-2006	DATE:	DATE:	DATE: 6-12-2006	DATE: 6-12-2006	GRAPHIC	1804-003	SHEET NO. 9	

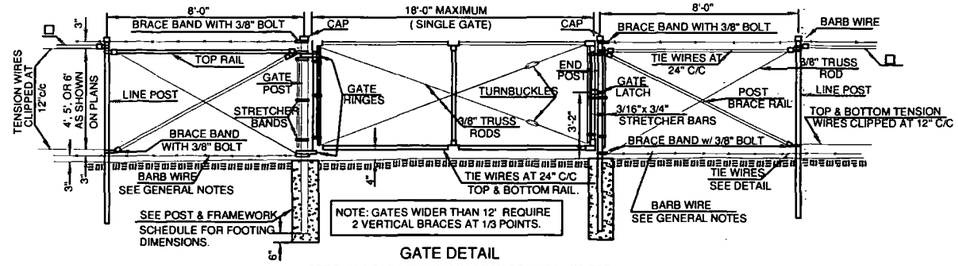


TYPICAL LINE POST DETAIL

NOTE: LINE POSTS MAY BE DRIVEN OR EARTH EMBEDED SEE SPECIFICATIONS

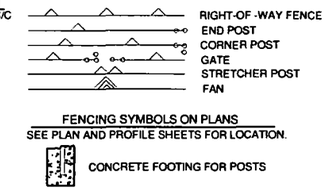
END, CORNER, & STRETCHER DETAILS

USE STRETCHER DETAILS AT ALL CORNERS, BENDS IN R/W, ON HILLTOPS, IN VALLEYS OR DEEP DEPRESSIONS, AND AT 500' MAXIMUM SPACING.
(REQUIRES CONCRETE FOOTING)

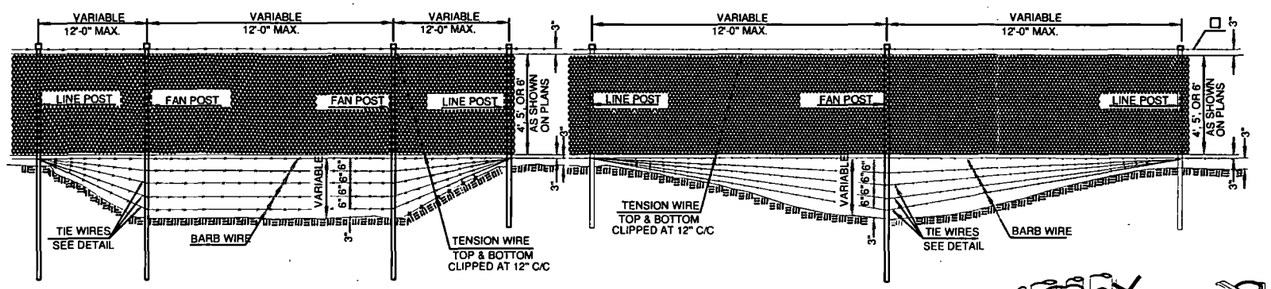


GATE DETAIL

SEE PLANS FOR SIZE AND LOCATION OF GATES. WHERE WIDTH GREATER THAN 18' IS REQUIRED, USE DOUBLE SWING GATES WITH MIDDLE LATCH.

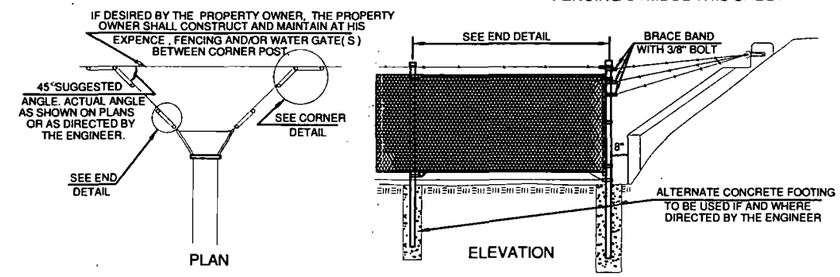


FENCING SYMBOL THIS SHEET

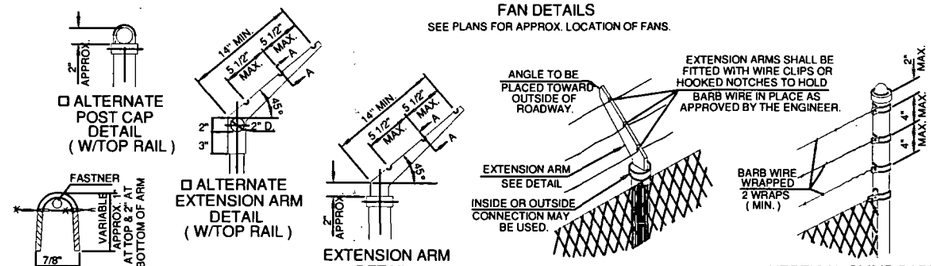


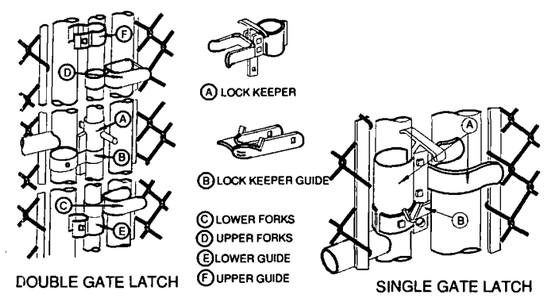
FAN DETAILS

SEE PLANS FOR APPROX. LOCATION OF FANS.



CULVERT CONNECTION





TYPICAL GATE LATCH DETAIL

ALTERNATE TYPE LATCH MAY BE USED IF APPROVED BY THE ENGINEER.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 1988 STANDARD SPECIFICATIONS AND APPLICABLE SPECIAL PROVISIONS.
2. COST OF BARB WIRE AND EXTRA LENGTH POSTS FOR FAN TO BE INCLUDED IN PRICE BID FOR CHAIN LINK FENCE.
3. THE BOTTOM BARB WIRE MAY BE OMITTED AND FABRIC INSTALLED 1 INCH CLEAR FROM GROUND LINE IN LOCATIONS APPROVED BY THE ENGINEER.
4. ALL MISCELLANEOUS HARDWARE SHALL BE FURNISHED GALVANIZED OR ALUMININUM ALLOY.
5. CLIMB BARRIER SHOWN INTENDED ONLY TO SHOW AN ACCEPTABLE TYPE. ALTERNATE CLIMB BARRIERS APPROVED BY THE ENGINEER PRIOR TO INSTALLATION MAY BE USED. FENCE POST EXTENSION ARM SHALL BE MADE OF PRESSED STEEL OR MALLEABLE IRON AND SHALL BE GALVANIZED AFTER FABRICATION.
6. CHAIN LINK FABRIC MAY BE ACCEPTED KNUCKLED BOTH SELVAGES IN ALL WIDTHS. NO FABRIC WITH TWISTS AND BARBS ON BOTH SELVAGES WILL BE ACCEPTED.
7. NOTE: CLASS A IN THE PAY ITEM DENOTES NO CLIMB BARRIER: CLASS B DENOTES CLIMB BARRIER. (CLASS A = NOBAR: CLASS B = BARR)
8. STRETCHER POSTS TO BE USED IN GENERAL AT HILL TOPS AND AT BOTTOM OF VALLEYS AND AT A MAXIMUM OF 500 FEET APART.
9. ALL POSTS WITH THE EXCEPTION OF LINE POSTS, FAN POSTS AND HEADWALL CONNECTION STRETCHER POSTS SHALL BE EMBEDDED IN CONCRETE WHEN FENCE IS BEING ERECTED ON EARTHEN FOUNDATIONS. OTHER POSTS MAY BE EMBEDDED IN CONCRETE IF AND AS DIRECTED BY THE ENGINEER TO SATISFY SPECIFIC FOOTING REQUIREMENTS.

POST & FRAMEWORK SCHEDULE

		LINE POST				END, CORNER, OR STRETCHER POSTS		GATE POSTS ○ 6' WIDE & LESS	OVER 6' TO 12' WIDE	OVER 12' TO 18' WIDE	TOP RAIL OR POST BRACE RAIL		GATE FRAMES GATES UP TO 6' WIDE	GATES OVER 6' TO 12'	GATES OVER 12' TO 18'
SHAPE		○	⊏	⊏	I	○	◬	○	○	○	○	⊓	○	○	○
NOMENCLATURE		1.5" PIPE	ROLL FORMED HEAVY "C"	ROLL FORMED STAND. "C"	"H" RAIL	2" PIPE	ROLL FORMED	2.5" PIPE	3.5" PIPE	5.0" PIPE	1 1/4" PIPE	ROLL FORMED	1 1/4" PIPE	1 1/2" PIPE	1 1/2" PIPE
DIMENSIONS		1.9" O.D. 1.6" I.D. 0.145" THK	2.25" x 1.7" 0.121" THK	1.875" x 1.625" 0.105" THK	2.25" x 1.7" 0.125" THK	2.38" O.D. 2.07" I.D. 0.154" THK	3.5" x 3.5" 0.126" THK	2.88" O.D. 2.47" I.D. 0.203" THK	4.0" O.D. 3.55" I.D. 0.226" THK	5.563" O.D. 5.047" I.D. 0.258" THK	1.66" O.D. 1.44" I.D. 0.11" THK	1.625" x 1.25" 0.075" THK	1.66" O.D. 1.44" I.D. 0.11" THK	1.9" O.D. 1.67" I.D. 0.114" THK	1.9" O.D. 1.61" I.D. 0.145" THK
CRITICAL AXIS SEC. MODULUS		.326 IN.^{3}	.506 IN.^{3}	.368 IN.^{3}	.661 IN.^{3}	.561 IN.^{3}	1.00 IN.^{3}	1.06 IN.^{3}	2.39 IN.^{3}	▼ 5.45 IN.^{3}	◐ 0.195 IN.^{3}	0.165 IN.^{3}	◐ 0.195 IN.^{3}	◐ 0.270 IN.^{3}	▼ 0.326 IN.^{3}
WEIGHT		2.72 LBS./LIN. FT.	2.64 LBS./LIN. FT.	1.85 LBS./LIN. FT.	3.26 LBS./LIN. FT.	3.65 LBS./LIN. FT.	4.85 LBS./LIN. FT.	5.79 LBS./LIN. FT.	9.11 LBS./LIN. FT.	14.62 LBS./LIN. FT.	1.81 LBS./LIN. FT.	1.35 LBS./LIN. FT.	1.81 LBS./LIN. FT.	2.17 LBS./LIN. FT.	2.72 LBS./LIN. FT.
LENGTH FOR GIVEN FENCE FAB. HTS.	4'	6'-10" W/CONC. FOOTING; 7'- 4" WHEN DRIVEN.				7'- 4" W/CONC. FOOTING				7'-10"					
	5'	8'- 1" W/CONC. FOOTING; 8'- 7" WHEN DRIVEN.				8'- 7" W/CONC. FOOTING				9'- 1"					
	6'	9'- 4" W/CONC. FOOTING; 9'-10" WHEN DRIVEN.				9'-10" W/CONC. FOOTING				10'- 4"					
EMBEDMENT FOR GIVEN FENCE FAB. HTS.	4'	24" IN CONC. FOOTING; 30" WHEN DRIVEN.				30" IN CONC. FOOTING				36"					
	5'	27" IN CONC. FOOTING; 33" WHEN DRIVEN.				33" IN CONC. FOOTING				39"					
	6'	30" IN CONC. FOOTING; 36" WHEN DRIVEN.				36" IN CONC. FOOTING				42"					
FOOTING DIM. IN EARTH		9" DIA.				9" DIA.	14" DIA.	12" DIA.	16" DIA.	18" DIA.					
		36" DEEP													
FOOTING DIM. IN ROCK		4" DIA.				4" DIA.	6" DIA.	5" DIA.	6" DIA.	8" DIA.					
		9" DEEP				9" DIA.	16" DIA.	12" DIA.	16" DIA.	24" DIA.					

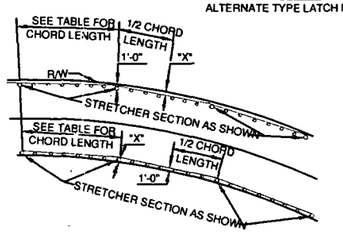
○ MAXIMUM WIDTH OF SINGLE SWING GATE TO BE 18 FT.; OPENING MAY BE UP TO 36 FT. WIDE

DIAMETERS AS SHOWN ARE MINIMUM VALUES. DEPTHS FOR ROCK ARE MINIMUMS. DEPTHS SHOWN FOR CONCRETE FOOTINGS IN EARTH ARE MINIMUM FOR 6 FT. HIGH FENCE, AND MAY BE REDUCED 3 IN. FOR EACH FOOT OF FENCE HEIGHT LESS THAN 6 FT. HIGH.

▲ WIRE FABRIC TO BE WOVEN INTO LOCK LOOPS FOR THE ENTIRE WIDTH OF THE FABRIC.

▼ SECTION MODULUS AS SHOWN IS BASED UPON ASTM A53, AND AASHTO M181. SEE SPECIFICATIONS FOR SUBSTITUTION FORMULA ON CLASS 2 COLD FORMED STEEL PIPE.

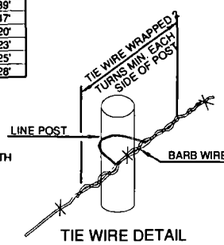
◐ SECTION MODULUS AS SHOWN IS BASED UPON ASTM A 501 AND AASHTO M 181. SEE SPECIFICATIONS FOR SUBSTITION FORMULA ON CLASS 2 COLD FORMED STEEL PIPE.



TYPICAL PLACEMENT FOR CURVES

SPACING FROM R/W FENCE	
DEGREE	"X"
1°00'	1.20'
2°00'	1.40'
3°00'	1.60'
4°00'	1.31'
5°00'	1.39'
6°00'	1.47'
7°00'	1.20'
8°00'	1.23'
9°00'	1.25'
10°00'	1.28'

SPACING FOR STRETCHER SECTION	
UP TO 1°00' CURVE	STD. FENCE
1°00' TO 3°00'	96' CHORDS
3°00' TO 6°00'	60' CHORDS
OVER 6°00'	36'CHORDS

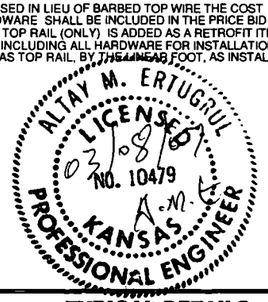


TIE WIRE DETAIL

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
624.06(D)	FENCE - STYLE CLF	L.F.
624.06(E)	GATES - STYLE CLF	EA.
932.16	TOP RAIL	L.F.

☐ WHEN TOP RAIL IS USED IN LIEU OF BARBED TOP WIRE THE COST OF TOP RAIL & HARDWARE SHALL BE INCLUDED IN THE PRICE BID FOR FENCE. WHEN TOP RAIL (ONLY) IS ADDED AS A RETROFIT ITEM, COST OF TOP RAIL, INCLUDING ALL HARDWARE FOR INSTALLATION, SHALL BE PAID FOR AS TOP RAIL, BY THE LINEAR FOOT, AS INSTALLED.



GENERAL NOTES

REVISIONS

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

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING — ENVIRONMENTAL — CONSTRUCTION

TYPICAL DETAILS
CHAIN LINKE FENCE
FORMER NATIONAL ZINC SITE
CHERRYVALE, KANSAS

DRAWN: ALB	CHECKED BY: TME	MATERIALS BY:	ENGINEER: ALB	APPROVED BY: TME	SCALE:	PROJECT NUMBER:	DRAWING NUMBER:	REV.:
DATE: 4-30-2006	DATE: 4-30-2006	DATE:	DATE: 4-30-2006	DATE: 4-30-2006	GRAPHIC	1804-003	SHEET NO. 10	