REVISED PLAN
for
FORMER NATIONAL ZINC SITE
CHERRYVALE, MONTGOMERY COUNTY, KANSAS

September 16, 2002

Presented to:

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

1000 Southwest Jackson, Suite 410
Topeka, Kansas 66612-1367

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ENVIRONMENTAL REMEDIATION

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Section I

Introduction

I. INTRODUCTION

Salomon Smith Barney Holdings, Inc. and United States Steel Corporation (Respondents) proposed a Plan (The Plan) for the former National Zinc site (Site) in Cherryvale, Kansas. The Plan consisted of Parts 1 through 7, and was submitted to Kansas Department of Health and Environment (KDHE) on or around April 3, 2002 for review and comment.

In preparing the Plan, the Respondents and their consultant, A & M Engineering and Environmental Services, Inc. (A & M Engineering) reviewed the available reports and correspondence listed below and relied on the information included in these documents.

a. The Expanded Site Inspection (ESI) Report (EPA I.D. KSD980-40698) and its appendices.

b. The Brownfields Targeted Assessment (BTA) Report prepared by KDHE in December 1999.

Respondents and their consultant also visited the Site on March 12, 2002 and met with KDHE at the Site and at the Cherryvale Library. The information obtained from discussions with the KDHE prior to, during, and after the Site visit was utilized in preparing the Plan.

In a letter dated August 2, 2002, KDHE related to Respondents their concerns and comments concerning the Plan and stated that they must be addressed to the Agency's satisfaction before KDHE will endorse the conceptual proposal. In Section II of this document, Respondents have set forth a response to KDHE's concerns and comments, and have addressed each comment separately.

The Revised Plan consists of five (5) phases, set forth in Sections IV through VIII hereof respectively. Phase 1 (Section IV) lists and presents the framework activities required for planning the initial field activities, which are presented in the Phase 2 Work Plan for Field Sampling and Construction for an interim Drainage System, hereinafter referred to as the "Phase 2 Work Plan" (Section V); Phase 3 (Section VI) provides for developing a Corrective Action Plan; Phase 4 (Section VII) provides for developing a Work Plan for Construction Activities; and Phase 5 (Section VIII) is to execute the Construction Activities Work Plan.

Respondents are seeking the approval by KDHE of the Phase 2 Work Plan (Section V) at this time. Phases 3, 4 and 5 are presented only to provide the framework for the full Revised Plan required to complete the project. Upon completion of the Phase 2 Work Plan, the Work Plans for other phases will be developed in their proper sequence and KDHE approvals will be obtained prior to their implementation.

The Phase 2 Work Plan (Section V) has been developed to implement the initial soil, sediment, surface water sampling and also the proposed Hydrogeological Investigation Work Plan. In the Phase 2 Work Plan, Respondents are also proposing to implement an interim Drainage Plan to limit the storm runoff water that enters the previously closed pond surface.

The information and data collected at the completion of the Phase 2 Work Plan will assist the Respondents in finalizing the Phase 3 Corrective Action Plan (Section VI) and obtaining KDHE

approval before proceeding with final development of the Phase 4 Work Plan for Construction Activities (Section VII).

As noted above, Respondents at this time request KDHE approval to proceed with the Phase 2 Work Plan (Section V). However, before moving to Section II of this Revised Plan and setting forth Respondents' responses to KDHE's August 2 Comment Letter, Respondents deem it important to bring one matter to KDHE's attention at the outset: the values for lead, arsenic and cadmium parameters included in the consensus-based TECs listed in Table 2 of the paper provided by KDHE as an attachment to its August 2 comment letter are well below the background levels at the site as measured by KDHE. Therefore, as is set forth more fully later in this document, Respondents believe that it is not feasible to use the consensus-based TECs as cleanup levels for stream sediments. Respondents believe that cleanup levels that are fully adequate and protective of the environment can be developed without reliance on the Table 2 TECs, and a framework for developing those cleanup levels is provided for herein.

Section II

Response to KDHE Concerns and Comments Included in August 2, 2002 Letter

II. RESPONSE TO KDHE CONCERNS AND COMMENTS INCLUDED IN AUGUST 2, 2002 LETTER

The following presents the Respondents response to each KDHE comment.

Comment 1: Section II-7-d, Page 4 – The text indicates that ground water contamination is likely not migrating offsite. This contention must be definitively established through ground water exploration and testing. In order to achieve finality for the site through the proposed remedy, this issue must be evaluated and resolved to KDHE's satisfaction. While KDHE ha agreed that the soil data generated during the 2001 Expanded Site Inspection (ESI) may be sufficient to guide the initial stages of contaminated soil consolidation and encapsulation at the site, the ground water exploration completed during that investigation was not sufficient to support conclusions concerning the nature, extent, or potential for exposure or ecological impacts posed by that contaminated medium. KDHE deems it necessary to determine the impacts to ground water, their extent off site, if any, and the relationship between ground water and surface water and the contamination therein. This investigative element was discussed during our on-site meeting. If, as the Work Plan suggests, the contamination is relatively immobile, the evaluation of its off-site impact should not be overly complex or burdensome. KDHE must consider both current and future use and identify the extent of contamination in ground water in order to evaluate remedial options and/or preclude any future potential for exposure through the implementation of meaningful and effective environmental use controls on affected properties on and off site.

Response: Respondents have prepared and are proposing a Hydrogeological Investigation Work Plan which is presented in Appendix A. The Phase 2 Work Plan also proposes to implement the Hydrogeological Investigation Work Plan. Following the completion of the proposed monitoring wells, Respondents will collect three monthly water quality and water level samples, as outlined in the Hydrogeological Investigation Work Plan and prepare a Phase 2 report which will present the information and data collected and also list the findings of the study and, if necessary, will also identify the applicable remedial options. All of the KDHE concerns listed in this comment will be addressed as part of the Phase 2 Work Plan and in the Phase 2 report.

Comment 2: Section II-4- To enhance the effectiveness and permanence of the remedy, consider using fly ash or hydrated lime to stabilize the waste and reduce the mobility of the inorganic constituents of concern.

Response: The contaminated soils and sediments will be removed in 6" layers, transported to the disposal area and spread with a dozer prior to compaction. Respondents note that during this process the contaminated soils will be well mixed and, under the proposed clay cap, will not leach any metal constituents. Therefore, Respondents believe that there is no need for additional stabilization of the removed soils and sediments by mixing with fly ash, hydrated lime or any other agent. Additionally, the disposal areas will be subject to deed restrictions where their future disturbance will be eliminated. Further, Respondents propose to construct an effective surface drainage system and cap for these areas.

Comment 3: Section II-4 – Before finalizing the remedial approach for the site, KDHE recommends the Respondents discuss the proposed remedy with the current landowner (the City of Cherryvale) to evaluate their future use plans for the site and evaluate whether the remedy could be reasonably modified to accommodate those future uses. In addition, it may be appropriate at the conclusion of the project to revise the site deed restriction to accommodate unrestricted or non-residential land use, as appropriate, in those portions of the site deemed free of soil and ground water contamination in excess of the Risk-Based Standards for Kansas (RSK) goals.

Response: Respondents are in the process of scheduling a meeting with the City to discuss this Revised Plan and to learn more about the City's plans for future usage of the site so they may be considered in the planning and execution phases of the project. Respondents' attorneys have also established contact with the City Attorney and, in principle, have discussed using property owned by the City as a source of clay and topsoil needed for the project. This borrow area is the same one utilized by the EPA during the residential soil removal project.

Comment 4: Section III, general comment – The Work Plan does not address the topic of long-term inspection and maintenance of the completed cap. This aspect of the remedy should be discussed; inadequate inspection and maintenance of the previous capping effort at the site led to failure of that remedy.

Response: A site inspection and maintenance plan will be developed under the requirements of the Phase 4 Construction Activities Work Plan and as a section of the Post Closure Care and Monitoring Plan. Respondents and their attorneys will discuss the site maintenance issues with the City of Cherryvale since it owns the property.

Comment 5: Section III, general comment – The United States Environmental Protection Agency (EPA) constructed a temporary cap over the soil repository for material excavated from residential yards and the Rodeo Grounds during their recent removal action, allowing the Respondents greater control over the ultimate cost of final capping. The Work Plan should address necessary improvements to that portion of the site to ensure the cap over those materials achieves the minimum construction standards and site remediation goals.

Response: The Respondents are in contact with the EPA's Project Manager. EPA was planning to start the Land Survey of the disposal area where they placed the soil material excavated from the residential yards. EPA also informed the engineer that they placed a minimum of 6" of soil cover over the disposal area. Respondents are planning the following regarding the EPA's disposal area:

1. Inspect the condition of the disposal area used by EPA.
2. Obtain the land survey report and plot the data from that report on the site map to be used by Respondents.
3. Conduct a Sampling Plan of the EPA disposal area as part of Phase 2 and as outlined in Appendix B.

4. Based on the findings of items 1 through 3 listed above, develop an activity in Phase 4 to grade and cap this area.

Comment 6: Section III-4-A, Page 7 – The Work Plan does not include a protocol for collection of confirmation samples following excavation of soil lifts. The plan should specify the spatial frequency, location, and method for collection and analysis of the confirmation samples. The text suggests that lead will be used as an indicator in determining the contaminated soil removal areas. Note that while the ESI findings indicated that arsenic contamination in excess of the KDHE non-residential RSK was largely co-located with lead contamination, this was not universally true; consequently, some areas may need to be addressed based on arsenic concentration. The constituents of concern, arsenic, cadmium and lead, should be included in confirmation sampling to verify the effectiveness of the soil removal.

Response: Under the Phase 3 Corrective Action Plan, Respondents will develop and submit a Sampling Plan to KDHE for review and approval which will include a protocol for confirmatory sampling of the excavated areas for soil and sediment removal and also for verification of the surface areas surrounding the identified excavation areas. The sampling protocol will require analysis of lead, arsenic and cadmium constituents in all samples.

The arsenic and cadmium results of KDHE sampling at the site were plotted on Figures 3-1 and 3-2. None of the cadmium samples exceeded the RSK value of 1000 mg/Kg.

Figure 3-3 shows the areas exceeding the RSK values for lead and arsenic at the site. Figures 3, 3-1, 3-2 and 3-3 are included at the end of the text.

Comment 7: Section III-4-A, Page 7- The text suggests that any area exceeding the RSK goal for lead after excavation of 18 inches of waste will be capped in place. It may be more economical and appropriate to determine the depth of soil exceeding the RSK goal before beginning any excavation. KDHE defers to the preference of the Respondents on this matter.

Response: Respondents will defer the decision whether to collect and analyze additional subsurface samples until after they meet with the City representatives and learn more about the City's plans for future usage of the site. If necessary, Respondents will either prepare an amendment to the Phase 2 Work Plan or include this sampling program in the Phase 3 Corrective Action Plan.

Comment 8: Section III-4-A, Page 7 – The goals for a stabilization/encapsulation remedy of this sort are specifically to minimize infiltration of precipitation into the waste, promote good surface drainage, resist erosion, improve aesthetics, minimize long-term maintenance, protect human health and the environment, and consider final use. The Work Plan for capping does not include specific performance standards to ensure these goals are attained by the remedy. The proposed 18-inch infiltration layer should have a hydraulic conductivity less than or equal to the hydraulic conductivity of any bottom liner system or natural subsoils. Where underlying soils possess hydraulic conductivities

greater than 1 x 10^{-5} centimeters per second, the infiltration layer should achieve 1 x 10^{-5} as a maximum permeability. The material used for the infiltration layer should, to the extent practicable, be free of rocks, clods, debris, cobbles, rubbish, and roots that may increase the hydraulic conductivity. The proposed cap should be adequate to withstand the local freeze-thaw conditions, which can be obtained from the Soil Conservation Service, local utilities, construction companies, and local universities. While six inches of soil dressing to support vegetations is an appropriate minimum, that layer should be matched to the rot zone needs of the proposed final vegetation, which has not been specified in this preliminary work proposal. Please include these or alternative proposals for performance criteria for the contemplated cap.

Response: Under the Phase 4 Construction Activities Work Plan, a Quality Assurance/Quality Control (QA/QC) Plan will be prepared and submitted to KDHE for approval. The QA/QC Plan will include procedures and specifications for selecting suitable clay and top soil material for construction of all the earthen components of the project. For clay material to be used for constructing the cap, permeability analysis will be performed along with development of windows information and, during the construction, compaction and moisture levels will be measured in order to assure that the compacted clay layers will meet the permeability requirements, which will be no greater than 1 x 10^{-7} centimeters per second.

The QA/QC Plan will meet the KDHE specifications for constructing clay cap, placement of vegetative and top soil (see Phase 3, (Section VI), paragraph 1)), and proper selection and placement of seeding.

Comment 9: Section III-4-B, Page 9 – The Work Plan proposes to use three times the arithmetic mean of the KDHE background sampling results to assess sediment impacts. This value is valid for assessment purposes at the CERCLA site screening phase but does not constitute an appropriate remedial goal. KDHE and the United States Fish and Wildlife Service (USFWS) are in the process of developing a sediment management strategy for the protection of freshwater ecosystems in Kansas. That strategy includes the use of consensus-based threshold effect concentrations (TECs), a composite goal that reflects current understanding of the contaminant level below which toxic effects are unlikely to be observed in the ecosystem. A copy of the Archives of Environmental Contamination and Toxicology article "Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems" is enclosed; the consensus-based TECs are listed in Table 2. These numbers are appropriate for assessment of the site and as remedial goals for dredging; however, before commencing any dredging operations, the KDHE/Bureau of Environmental Remediation must coordinate those activities with and obtain the concurrence of the KDHE Bureau of Environmental Field Services (BEFS), the Kansas Department of Agriculture Division of Water Resources (KDA/DWR) and USFWS. Those groups are tasked with evaluating the affected stream reaches to determine whether dredging to remove contaminants will be beneficial or harmful to the local ecological communities, and determining whether any

dredging management measures or post-dredging restorative measures are warranted. Once the Respondents have completed the sediment/surface water impact assessment phase described in the Work Plan and prepared a formal work proposal to address the affected stream reach(es), KDHE will review that proposal and site conditions with those stakeholders. Please revise the plan to include this sediment impact assessment and remediation strategy.

Response: Respondents have reviewed the paper titled "Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems" provided by KDHE as an attachment to the August 2, 2002 letter. The consensus-based TECs recommended in this paper are far below the background levels for constituents of concern in Drum Creek sediments as measured by KDHE. The following presents a comparison of TECs with KDHE sample results for sediment background concentrations for lead, cadmium and arsenic:

	Consensus Based TEC Mg/Kg	Sediment Background in Drum Creek Mg/Kg
Lead	35.8	36.11
Arsenic	9.79	27.79
Cadmium	0.99	3.76

Respondents propose, as part of Phase 2, to conduct the sediment and surface water sampling plan presented in Appendix B in order to gather additional sediment and surface water quality data to determine the following:

1. Further define the background levels of parameters of concern. Sediment samples including the background samples taken from Drum Creek will be analyzed for lead, arsenic, cadmium, mercury, chromium and zinc.

2. Collect a sufficient number of discreet sediment samples downstream from the point where the Unnamed Creek joins Drum Creek in order to study the level of environmental impact in Drum Creek and also to assist in developing cleanup levels for the parameters of concern.

3. Collect sufficient number of sediment samples from Unnamed Creek in order to prepare an inventory of the location and volume of sediments to be removed.

4. Surface water samples will be collected from approximately the same locations as the sediment samples in Drum Creek which will provide an indication as to the solubility of the parameters of concern in the sediments.

5. When standing water or water flow in the Unnamed Creek is encountered, a sufficient number of surface water samples will be collected to determine the level of impact and also to compare with ground water samples to determine if there is any interaction between groundwater and surface water.

6. By studying the data to be collected by the implementation of the Sampling Plan

proposed by the Respondents and the data previously collected by KDHE, Respondents will develop and propose cleanup levels for parameters of concern for sediments in Drum Creek and also the Unnamed Creek.

7. Respondents will also utilize data from the Phase 2 report to make recommendations as to which areas, if any, in Drum Creek would sediment removal be warranted and of benefit to the environment.

The surface water samples collected from Unnamed Creek and Drum Creek will be analyzed for lead, arsenic, cadmium, mercury, chromium and zinc.

In addition, the following information will be collected from the flowing surface water samples in both creeks: specific conductance by EPA Method 120.1, field temperature, total hardness as $CaCO_3$ and total suspended solids by EPA Method 160.2.

Comment 10: Section III-4-B, Page 9 – The Work Plan suggests that "Respondents do not anticipate removing any sediments from Drum Creek at this time." This may need to be re-evaluated in light of KDHE comment 8 above. Please review the KDHE findings for Drum Creek relative to the TECs or site-specific background concentrations for the inorganic constituents of concern.

Response: As stated in the response to Comment 9, at the completion of the Phase 2 Work Plan and Phase 2 report, sufficient data will be collected to examine if and where sediment removal from Drum Creek would be warranted and whether sediment removal would benefit short-term and long-term environmental quality in that stream.

Comment 11: Section III-4-C, Page 9 – See comment 7 above regarding capping goals and minimum performance requirements.

Response: See the response to Comment 8.

Comment 12: Section III-4-F, Page 10 – See comment 1 above regarding ground water contamination.

Response: See the response to Comment 1.

Comment 13: Section IV-Part 8, Task 3, Page 12 – See comment 8 (9) above regarding sediment remediation goals.

Response: See the response to Comment 9.

Comment 14: Site figures – Please include the EPA soil repository from the residential yards/rodeo ground removal action on the site figures. Also, it would be helpful to include the concentrations of site contaminants other than lead that were detected in

surface soil during the KDHE ESI, where the extent of contamination in excess of remediation goals extended beyond the lead impact shown on Figure No. 3.

Response: When the land survey information is provided by the EPA, Respondents will plot the soil repository site on the appropriate drawings. Respondents are also planning to conduct a soil testing program of the EPA disposal area as part of Phase 2 for measuring the lead, arsenic and cadmium levels in the contaminated soils placed in the repository site, as outlined in Appendix B.

The arsenic and cadmium sampling results are plotted on Figures 3-1 and 3-2. Figure 3-3 shows the areas exceeding the RSK values for lead and arsenic which generally coincide, with the exception of a small area north of the closed lagoon. Figures 3, 3-1, 3-2 and 3-3 are included at the end of the text.

Comment 15: Sampling and Analysis Plan, general – See comment 6 above.

Response: See the response to Comment 6.

Comment 16: Sampling and Analysis Plan, Sediment Sample Collection, Page 1 – Explain how composite results will be interpreted and how those interpretations will be applied for any remedial action deemed necessary, i.e., if a composite sample of 10 aliquots exceeds one tenth of the sediment action goal, will the entire sampled reach be considered for dredging? Also, it is unclear why so many samples are being dedicated to

the unnamed tributary segment when KDHE results indicated a significant impact throughout that stretch and beyond the confluence with Drum Creek. More useful information might be obtained by focusing sediment and surface water characterization efforts further downstream where the limits of impact might be reached and defined.

Response: The Revised Sampling and Analysis Plan presented in Appendix B requires that only discrete sediment samples be taken on the Unnamed Creek's drainage pathway for determining the location and the volume of sediments that will require removal. Discrete sediment sampling locations and the number of samples to be taken in the Unnamed Creek bed will be determined in the field.

Respondents are also proposing to take discrete sediment samples from the Drum Creek channel at locations shown in Figure 1 in Appendix B. The Respondents' objective is to take samples where sediments are concentrated. The sampling locations shown on Figure 1 may be adjusted in the field in order to take samples from locations where the sediments are concentrated.

Comment 17: Sampling and Analysis Plan, Sediment Sample Collection, Page 1 – The text indicates that KDHE background sample result values will be used, yet background samples are included in the sampling protocol and figure. The locations designated as background on the figure appear to be within an agricultural field. It is unclear how the Respondents propose to use results from these locations.

Response: The Revised Sampling and Analysis Plan presented in Appendix B eliminates background sampling locations for the Unnamed Creek. The previously proposed background samples in the drainage area feeding the Unnamed Creek are also eliminated.

Respondents are proposing to take additional sediment background samples for Drum Creek in order to establish a better data base to be used in determining a reasonable set of clean-up levels for the contaminants of concern. Respondents are also of the opinion that background sediment levels determined to represent Drum Creek should also be utilized for the Unnamed Creek since it feeds Drum Creek. Respondents are also preparing to utilize the KDHE background data along with the new data.

Comment 18: Sampling and Analysis Plan, Water Sampling, Page 7 – Surface water sampling is not included as a task element in the main work plan; however, KDHE deems that sampling appropriate. The Sampling and Analysis Plan initially indicates surface water samples will be collected along Drum Creek, and later that they will be collected along the unnamed drainage channel and Drum Creek. Surface water in the unnamed drainage, if present, should be collected to characterize the relationship between contaminated ground water and surface water. Surface water level gauging may also be a meaningful aspect of that effort.

Response: The Revised Sampling and Analysis Plan presented in Appendix B requires sampling the standing surface water and if flowing surface water exists, it will be

sampled and all surface water samples will be analyzed for the parameters of concern (lead, cadmium, chromium, mercury, arsenic and zinc).

At this time, Respondents do not believe that gauging on the Unnamed Creek or Drum Creek will be necessary.

Comment 19: Sampling and Analysis Plan, Water Sampling, Decontamination Procedures, Page 8 – After cleaning sampling equipment with Alconox and prior to collecting any samples, the equipment should be thoroughly washed with deionized water.

Response: The Revised Sampling and Analysis Plan includes a procedure to thoroughly wash the sampling equipment with deionized water prior to its use.

Comment 20: Sampling and Analysis Plan, Analytical Parameters, Page 9 – KDHE/BEFS has indicated that some additional surface water sample parameter analyses need to be conducted in order to assess and interpret surface water and sediment contamination meaningfully. Those parameters include: specific conductance by EPA 120.1, field temperature, total hardness as $CaCO_3$, and total suspended solids by EPA 160.2. Again, KDHE/BER will need to be coordinated with KDHE/BEFS, KDA/DWR, and USFWS after performing the initial sediment/surface water characterization activities and prior to initiating any stream remediation activities.

Response: The Revised Sampling and Analysis Plan includes procedures to measure the specific conductance by EPA Method 120.1, field temperature, total hardness as $CaCO_3$ and total suspended solids by EPA Method 160.2.

Comment 21: Sampling and Analysis Plan, Quality Control and Quality Assurance, Page 9 – The frequency of duplicate samples must be specified. Where reusable sampling equipment is employed to collect samples, equipment rinsate blanks should be collected at a rate of one per twenty investigation samples per medium or one per day per medium, whichever is less, to demonstrate that decontamination procedures are effective in preventing cross-contamination.

Response: The Revised Sampling and Analysis Plan, Quality Control and Quality Assurance, Page 9, has been revised to specify a duplicate sample frequency of one duplicate per 20 field samples collected.

The Revised Sampling and Analysis Plan also requires the following: where reusable sampling equipment is employed to collect samples, equipment rinsate blanks will be collected at a rate of one per twenty investigation samples per medium or one per day per medium, whichever is less, to demonstrate that decontamination procedures are effective in preventing cross-contamination.

Section III

Background Information

III. BACKGROUND INFORMATION

The key Site-specific information obtained from the documents above and considered in preparing the Plan and this Revised Plan is listed as follows:

1. The Site consists of approximately 360 acres containing the former National Zinc smelter facility on the northern edge of Cherryvale, Kansas.

2. At the request of KDHE, limited response actions were initiated at the site by National Zinc Company in October 1977. Beginning in 1979, contaminated water from the lagoon was treated and discharged into the adjacent Drum Creek. Ore and sludge were removed from the Site. Some of the remaining sludge was treated with lime and encapsulated on Site. The lagoon on the west side of the Site was filled with dirt and top soil and planted with grass. Five monitoring wells were installed on the western and southern edges of the lagoon. Analytical results of ground water samples collected in 1982, 1983 and 1984 showed high concentration levels of cadmium and lead.
   In an April 5, 1983 letter from KDHE to National Zinc, the cleanup and closure of the surface impoundments were found to be satisfactory and, at the same time, KDHE instructed National Zinc Company to perform some repair work of eroded areas and to continue ground water monitoring on a quarterly basis. Restrictive covenants limiting use of the Site were issued in 1983 and are still in effect.

3. In 1988, the City of Cherryvale purchased the Site property.

4. KDHE inspected the Site in May 1995 following a City of Cherryvale inquiry into possible restrictive covenant termination and re-development of the Site property. Surface water, soil, sediment and sludge/waste samples were obtained by KDHE. As a result of this sampling, Lead was detected at a maximum of 176,750 mg/Kg, above the non-residential Risk-Based Standard for Kansas (RSK) level of 1,000 mg/Kg. Cadmium was detected at 2,816 mg/Kg, above the Kansas non-residential RSK level of 1000 mg/Kg. The surface water and groundwater sampling results on Site exceeded Maximum Contaminant Levels (MCL) for Lead and Cadmium.

5. Cadmium was detected in surface and ground water up to 0.111 mg/L, which is above the MCL of 0.005 mg/L. In July 1996, sediment/sludge sampling indicated Lead of 1,786 mg/Kg, which is above the non-residential RSK level of 1,000 mg/Kg, and Cadmium in surface water up to 0.347 mg/L in standing water on Site.

6. On March 25, 1999, the City of Cherryvale submitted an application for KDHE to conduct a Brownfields Targeted Assessment (BTA) on the Site. The application was accepted by KDHE in April of 1999. The chemical and physical data collected during the BTA assessment were also used in preparing the ESI Report and, therefore, the conclusions included in the ESI Report are similar to those in the BTA Report. Following are the statements included among the conclusions of the BTA report.

   a. The BTA identified a significant area of Lead contamination in surficial soils at

the Site in excess of the Kansas RSK value of 1,000 mg/Kg for Lead in non-residential soils. The area of Lead contamination is generally in the immediate area of the intersecting railway and former production areas in the southeast portion of the Site, and lies to the northeast and southwest of the railway in this southeast area.

b. A large area, approximately the northeast ¼ of the site, was identified not to be significantly impacted by heavy metals constituents from the former National Zinc facility.

c. Surface water was identified to be impacted by several heavy metals constituents, primarily Cadmium, across the Site.

d. Elevated levels of Cadmium in ground water were also observed, primarily in areas underlain by the former lagoons, which were subsequently used as a waste disposal unit and covered. It does not appear that the ground water contamination is mobile and, thus, is likely not migrating off Site. Human exposure to contaminated ground water is minimal, although migration of impacted ground water in former lagoon to surface water via base flow is a probability.

7. In March 2001, KDHE completed an Expanded Site Inspection (ESI) Report for the Site. In preparing this report, KDHE conducted an extensive investigation and collected additional soil and water samples in order to fill data gaps. The following are among the conclusions of the ESI Report.

a. The pathways of greatest concern at the Site are the soil and surface water pathways. Observed release criteria for Hazard Ranking System (HRS) purposes appear to be met for both pathways as documented in the ESI.

b. Elevated Lead, Chromium and Silver concentrations were detected in the ground water. The area of elevated Lead, Chromium and Silver concentrations in ground water appears to be limited to within the former lagoon area.

c. In determining which surface water and soil samples were elevated, the laboratory results for off-Site samples for each type of constituent were compared with a concentration that was equal to or greater than three times (3X) the arithmetic mean of the background concentration.

Section IV

Phase 1—Develop Framework for Revised Plan

IV. PHASE 1 – DEVELOP FRAMEWORK FOR THE REVISED PLAN

The framework for developing the Revised Plan consists of Parts 1 through 5 set forth below:

Part 1: Identify any data gaps and prepare a sampling plan and quality control/quality assurance plan for any additional sampling:

Respondents believe that the chemical data gathered on the surface soil contamination at the Site is sufficient. Respondents are proposing additional sampling for two purposes.

1. Collection of additional sediment and surface water samples from within the Unnamed Creek and Drum Creek to assess the extent of contamination in the surface water pathway and to establish background levels.

2. Collect soil samples at EPA's disposal area to document the level of contamination in soils brought from off-site excavation.

Appendix B presents the proposed sampling plan and quality control/quality assurance plan for additional chemical soil, sediment and surface water sampling. Figure 1 shows the Site contour map and grid system, which is the same grid system used by KDHE in its investigations.

Part 2: Prepare a safety plan to be used during additional Site sampling:

The safety plan presented in Appendix C will be implemented during Site sampling activities. It will also be applicable to other field activities conducted at the Site.

Part 3: Develop an interim drainage plan:

Respondents believe that run-on storm runoff should be diverted from entering the previously closed lagoon surface area. An interim drainage plan has been developed to prevent surface water from entering the capped surface area of the previously closed lagoon, which will enhance the stability of the subsurface condition of this area and improving its ability to support the construction equipment and additional load from fill and capping material. Figure 2 presents the interim drainage plan in preliminary engineering design format. A shallow subsurface drain system will be added to the drainage system shown on Figure 2 in the field during construction.

Part 4: Develop a Hydrogeological Investigation Work Plan

Respondents developed and are presenting a Hydrogeological Investigation Work Plan in Appendix A to determine the impact of on-site conditions to groundwater

and determine if a relationship between groundwater and surface water exists.

Part 5: Submit the Revised Plan to KDHE for approval prior to implementation of Phase 2 (Section V):

Section V

Phase 2—Plan for Field Sampling and Construction of Interim Drainage System

V. PHASE 2 PLAN FOR FIELD SAMPLING AND CONSTRUCTION OF AN INTERIM DRAINAGE SYSTEM

Respondents propose that they be authorized by KDHE to proceed with the Phase 2 Work Plan outlined below in parts 6 through 9. They plan to schedule the field work as soon as KDHE approval is received.

Part 6: Implement the Soil, Sediment and Surface Water Sampling Plan presented in Appendix B.

Develop a report presenting the sampling results.

Part 7: Implement the interim Drainage Plan.

Following the construction of the storm runoff diversion dike around the closed pond, the water levels in the area will be measured on a monthly basis for a period of no less than three months in order to study and document the effects of the constructed dike.

Part 8. Implement the Hydrogeological Investigation Work Plan.

The Hydrogeological Investigation Work Plan presented in Appendix A will be implemented and the water quality sampling and water level measurements listed

in the Plan will be conducted. Also a report will be prepared to present the data collected and the findings of the study.

Part 9. Prepare a report to summarize the Phase 2 field work results.

In addition to the matters discussed in Parts 6, 7 and 8 above, this report will also include the following:

1. Develop and propose to KDHE clean-up levels to be used in determining areas where sediment removal will be warranted.

   The sediment samples previously obtained by KDHE showed background concentrations for lead, cadmium and arsenic well above the consensus-based TECs listed in the paper (Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems by D.D. McDonald, C.G. Ingersoll and T.A. Berger) provided by KDHE as an attachment to their August 2, 2002 letter.

   Also, the downstream sediment samples obtained by KDHE showed unexpected fluctuations. Respondents are proposing to take sufficient number of samples from both the Unnamed Creek and Drum Creek in upgradient and downgradient positions in order to prepare an effective sediment/surface water impact assessment report and to develop more

meaningful clean-up levels.

2. Study the impact of sediment removal from Drum Creek, evaluate the consequences of any removal, and quantify the volume of sediment to be removed from Drum Creek, if any, and from Unnamed Creek.

3. Evaluate the Hydrogeological Investigation Work Plan results and determine if there is any migration of on-site groundwater and, if any, what is the impact.

4. Identify and evaluate the corrective measures, if any, required for groundwater.

Respondents anticipate completing the implementation of Phase 2 Work Plan and submission of the Phase 2 report no later than 6 months from the date of receipt of approval from KDHE to proceed with Phase 2.

Section VI

Develop Corrective Action Plan

VI. PHASE 3 DEVELOP A CORRECTIVE ACTION PLAN

The Phase 3 Corrective Action Work Plan will be directed toward development of a Corrective Action Plan for the entire site. The Corrective Action Plan will be developed after completion of the Phase 2 Work Plan and report, and cover the following:

1. Consolidation of contaminated soils on the site.

   The following presents a brief description of the Respondents' present thoughts on the development of the Corrective Action Plan. Most of the information listed below was also included in the previous Plan dated April 3, 2002.

   Respondents propose to use Kansas non-residential RSKs to determine the areas and volume of contaminated soils to be removed and consolidated at the Site. These are 1000 mg/Kg for Lead, 1000 mg/Kg for Cadmium, and 38 mg/Kg for Arsenic.

   Surface areas where soil removal will be warranted will be determined using the chemical data previously gathered by KDHE. The lead, arsenic and cadmium concentrations will be utilized in determining the areas and volume of soil removal. Figures 3, 3-1, 3-2 and 3-3 show the analytical results and the areas exceeding the RSK values. The figures are included

at the end of the text.

Surface areas within the Site boundary with a total contaminant level equal to or above any of the following parameters, 1000 mg/Kg lead, 1000 mg/Kg cadmium and 38 mg/Kg arsenic will be excavated and transported to the previously closed lagoon area for placement. Figures 3, 3-1, 3-2 and 3-3 (figures are included at the end of the text) show the KDHE chemical sampling results and the areas where lead, cadmium and arsenic levels are equal to or exceed the RSK levels and, therefore, will require removal of contaminated soils in accordance with the following: an initial 6" thick layer of soil will be removed, and the excavated area retested. A confirmatory sampling will be performed based on a Sampling Plan that will be submitted to KDHE in the Phase 4 Construction Activities Work Plan to determine where additional soil removal is needed. If the RSK levels for any one of the contaminants of concern are still exceeded, an additional 6" layer of soil will be removed. Any excavated area that exceeds the RSK level for any of the contaminants of concern after removal of 18" of soil will be capped with a minimum of 18" thick compacted clay followed with 6" of vegetative soil followed by a 6" thick layer of topsoil and proper seeding. All other excavated areas will be covered with a minimum of 6" of soil and properly seeded.

The area utilized by EPA for placement of the excavated soils from residential areas will be evaluated. Respondents have been informed by EPA's Project Manager that the area utilized by EPA was properly graded and capped with a minimum of 6" thick clean soil. Respondents included an activity in the Phase 2 Work Plan to sample the contaminated soils in EPA's disposal site to determine if deed restriction will be required for this area and also if the cap placed by EPA will satisfy the KDHE requirements.

The excavated soil material will be placed on the surface of the previously closed lagoon area and graded prior to placing a new cap at the receiving areas which will contain a minimum of 18" of compacted clay followed with 6" of vegetative soil and 6" of topsoil and proper seeding.

2. Removal of sediments from Unnamed Creek and Drum Creek.

3. Repair of existing closed lagoon area.

4. A final surface drainage plan.

5. Groundwater remediation, if warranted

Section VII

Phase 4—Develop a Work Plan for Construction Activities

VII. PHASE 4 DEVELOP A WORK PLAN FOR CONSTRUCTION ACTIVITIES

As a result of Phase 3, a Corrective Action Plan will be developed for the site. The objective of the Phase 4 Construction Activities Work Plan is to develop a Corrective Action Construction Work Plan that will provide guidelines for the implementation of the Corrective Action Plan. The following will be included in this Construction Activity Work Plan:

- Engineering drawings to assist construction
- Volume calculations
- A Sampling Plan to collect and analyze confirmation sampling during the removal of contaminated soils an sediments from the surface water pathway
- Construction schedule
- QA/QC Plan for selection of suitable clay soil and the installation of the clay cap and other earthen components of the project
- Storm Runoff Management and Pollution Prevention Plan
- Post Closure Inspection and Maintenance Plan
- Plan for sediment control
- A Safety Plan covering the construction activities
- Dust Control and Air Pollution Prevention and Monitoring Plan
- Any other plans or procedures that may be determined later.

The Construction Work Plan will be submitted to KDHE for approval prior to startup of construction activities.

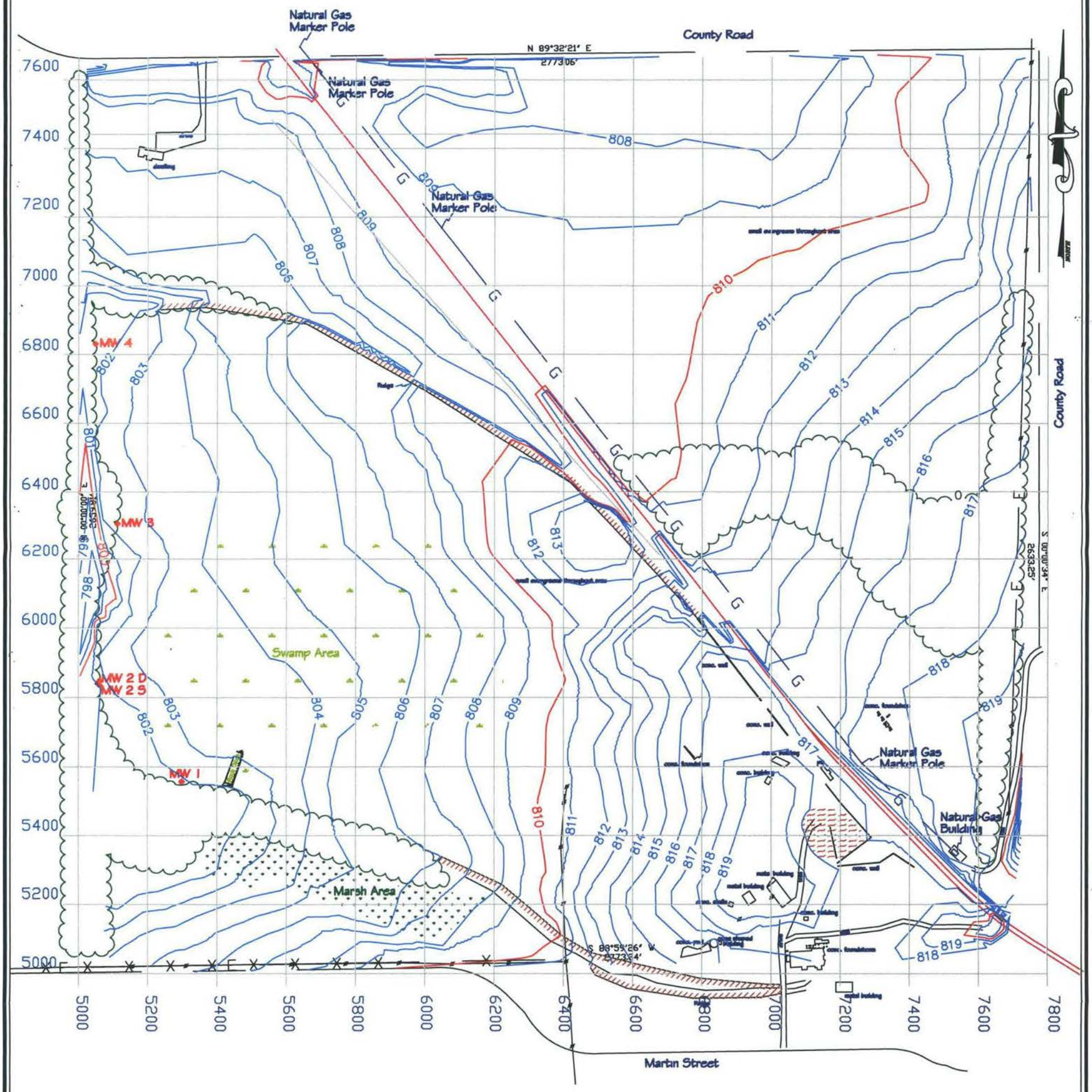
Section VIII

Phase 5—Execute the Construction Work Plan

VIII. PHASE 5 EXECUTE THE CONSTRUCTION WORK PLAN

Following are the work items to be included in this Plan:

- Conduct and complete construction activities
- Perform all QA/QC activities
- Prepare as-built drawings
- Prepare certification document
- Conduct land survey and prepare deed restrictions, as necessary.



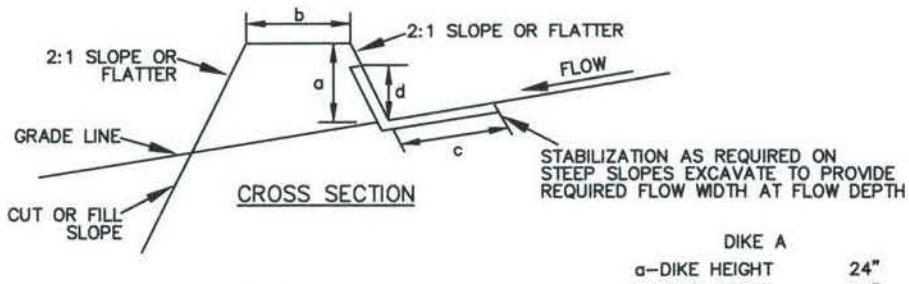
A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

BASE MAP
NATIONAL ZINC SITE, CHERRYVALE, KANSAS

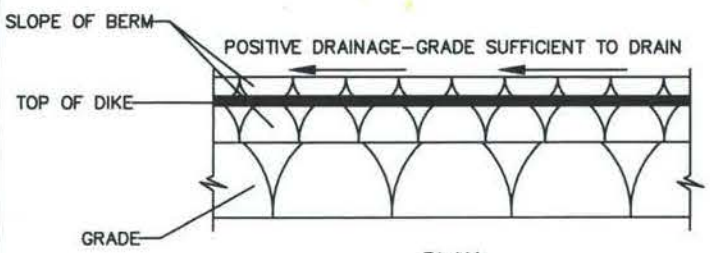
SCALE:	DATE:	FIGURE NO.
1" = 300'	3-26-2002	1
APPROVED BY: AME	DRAWN BY: ALB	PROJECT NO.

DETAIL–EARTH DIKE (DIVERSION DIKE)
NTS



CROSS SECTION

DIKE A	
a–DIKE HEIGHT	24"
b–DIKE WIDTH	24"
c–FLOW WIDTH	2'
d–FLOW DEPTH	12"



PLAN

STANDARD SYMBOL

A–1

CONSTRUCTION SPECIFICATIONS

1. ALL DIKES SHALL BE COMPACTED BY EARTH–MOVING EQUIPMENT.
2. ALL DIKES SHALL HAVE POSITIVE DRAINAGE TO AN OUTLET.
3. TOP WIDTH MAY BE WIDER AND SIDE SLOPES MAY BE FLATTER IF DESIRED TO FACILITATE CROSSING BY CONSTRUCTION TRAFFIC.
4. FIELD LOCATION SHOULD BE ADJUSTED AS NEEDED TO UTILIZE A STABILIZED SAFE OUTLET.
5. EARTH DIKES SHALL HAVE AN OUTLET THAT FUNCTIONS WITH A MINIMUM OF EROSION.
6. FLOW CHANNEL STABILIZATION SHALL BE PER THE CHART BELOW:

FLOW CHANNEL STABILIZATION

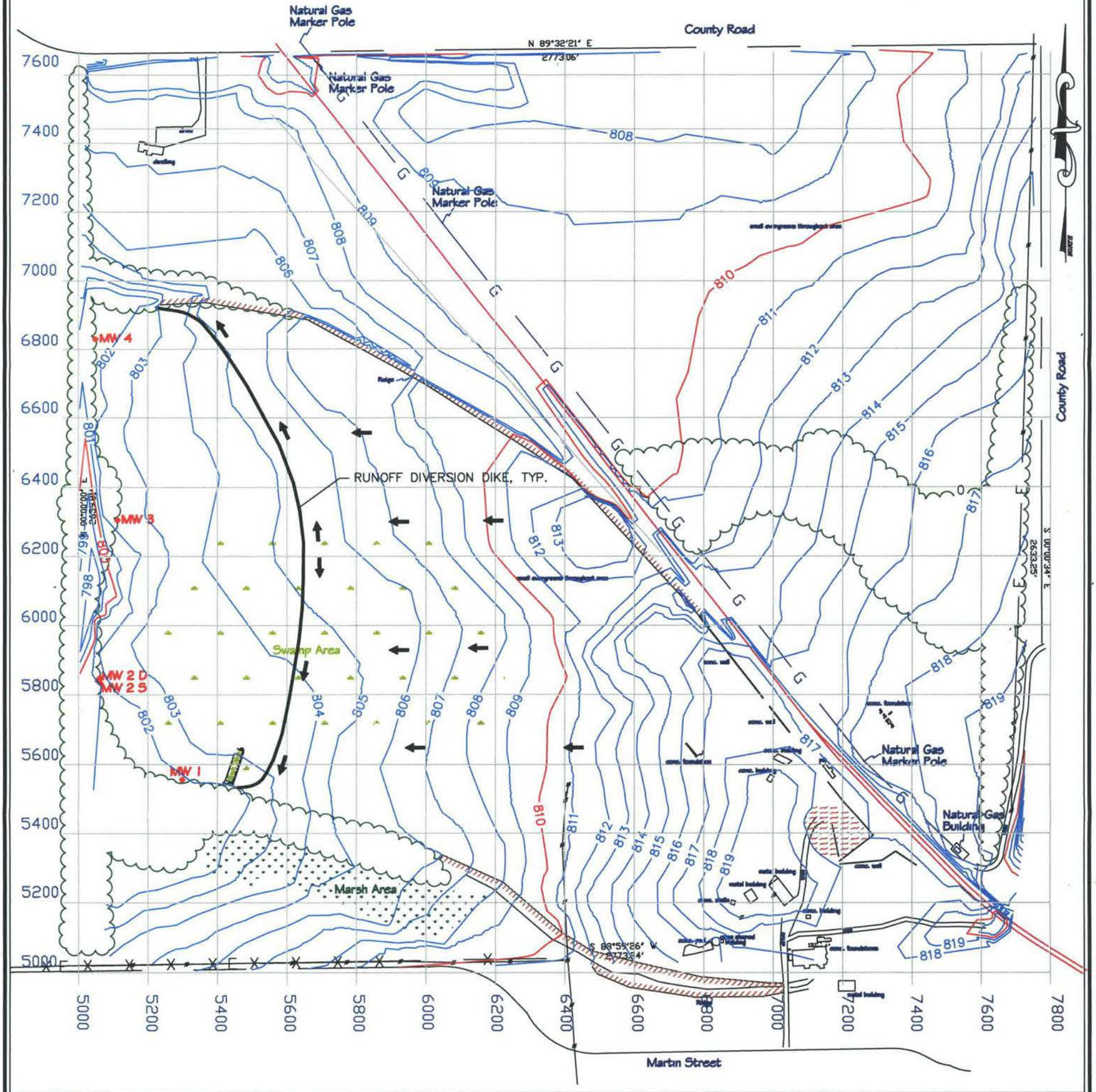
TYPE OF TREATMENT	CHANNEL GRADE	DIKE A
1	0.5–3.0%	SEED AND STRAW MULCH
2	3.1–5.0%	SEED AND STRAW MULCH
3	5.1–8.0%	SEED WITH JUTE, OR SOD; 2" STONE
4	8.1–20%	LINED RIP–RAP 4–8"

A. STONE TO BE 2 INCH STONE, OR RECYCLED CONCRETE EQUIVALENT, IN A LAYER AT LEAST 3 INCHES IN THICKNESS AND BE PRESSED INTO THE SOIL WITH CONSTRUCTION EQUIPMENT.

B. RIP–RAP TO BE 4–8 INCHES IN A LAYER AT LEAST 8 INCHES THICKNESS AND PRESSED INTO THE SOIL.

C. APPROVED EQUIVALENTS CAN BE SUBSTITUTED FOR ANY OF THE ABOVE MATERIALS.

7. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

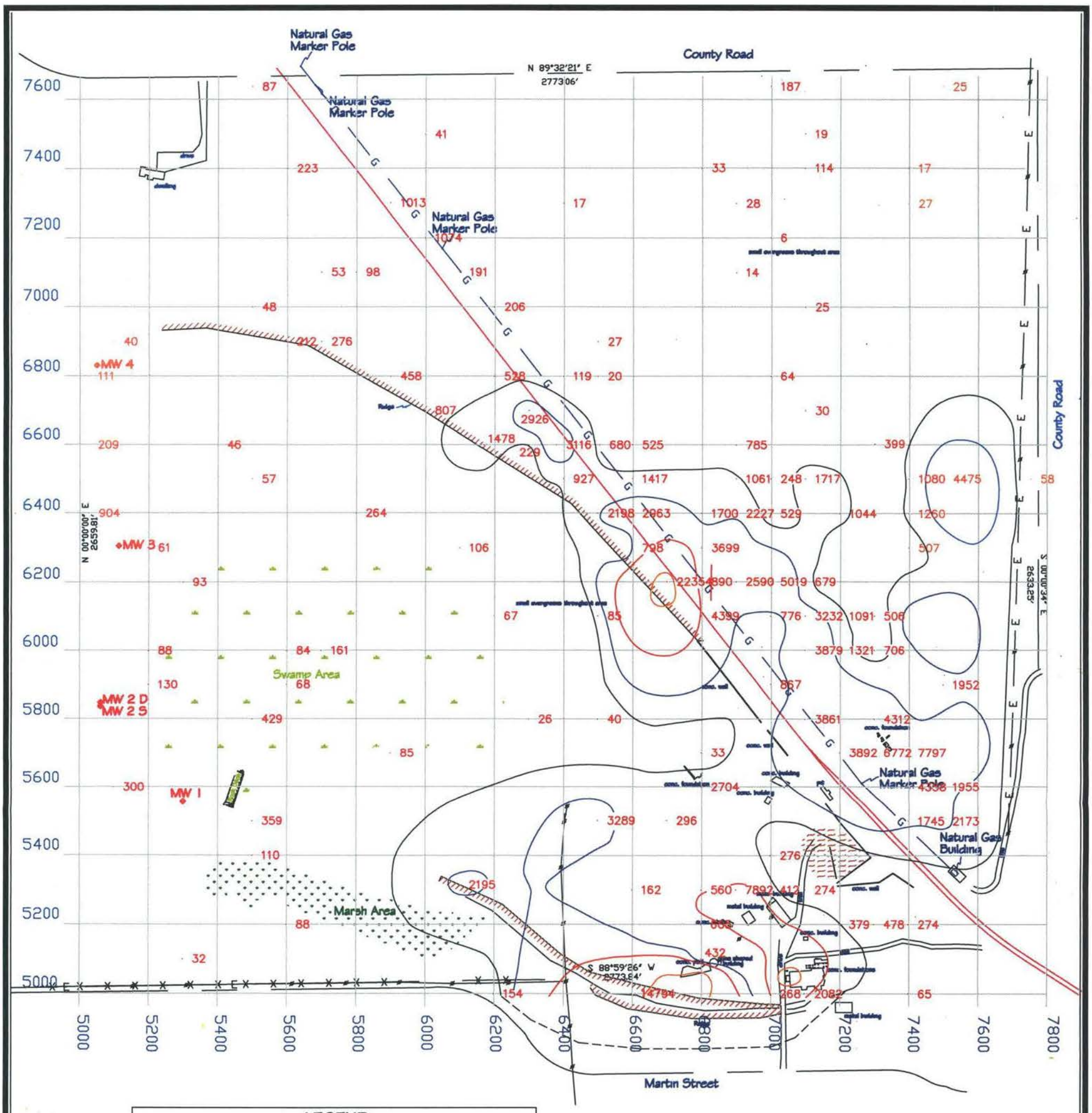


A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

RUNOFF DIVERSION DIKE
NATIONAL ZINC SITE, CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
1" = 300'	3–26–2002	2
APPROVED BY: AME	DRAWN BY: ALB	PROJECT NO.



LEGEND

- 14794 = Sample Location & Concentration (mg/kg)
- = 1000 mg/kg Isocontour
- = 2000 mg/kg Isocontour
- = 5000 mg/kg Isocontour
- = 20000 mg/kg or greater Isocontour
- • = Lath Set
- Power Pole
- Tree Line
- Water
- Railroad
- E — Overhead Electric
- G — Underground Natural Gas

LEAD

RSK = 1000 mg/Kg

RSK = RISK BASED STANDARD FOR KANSAS

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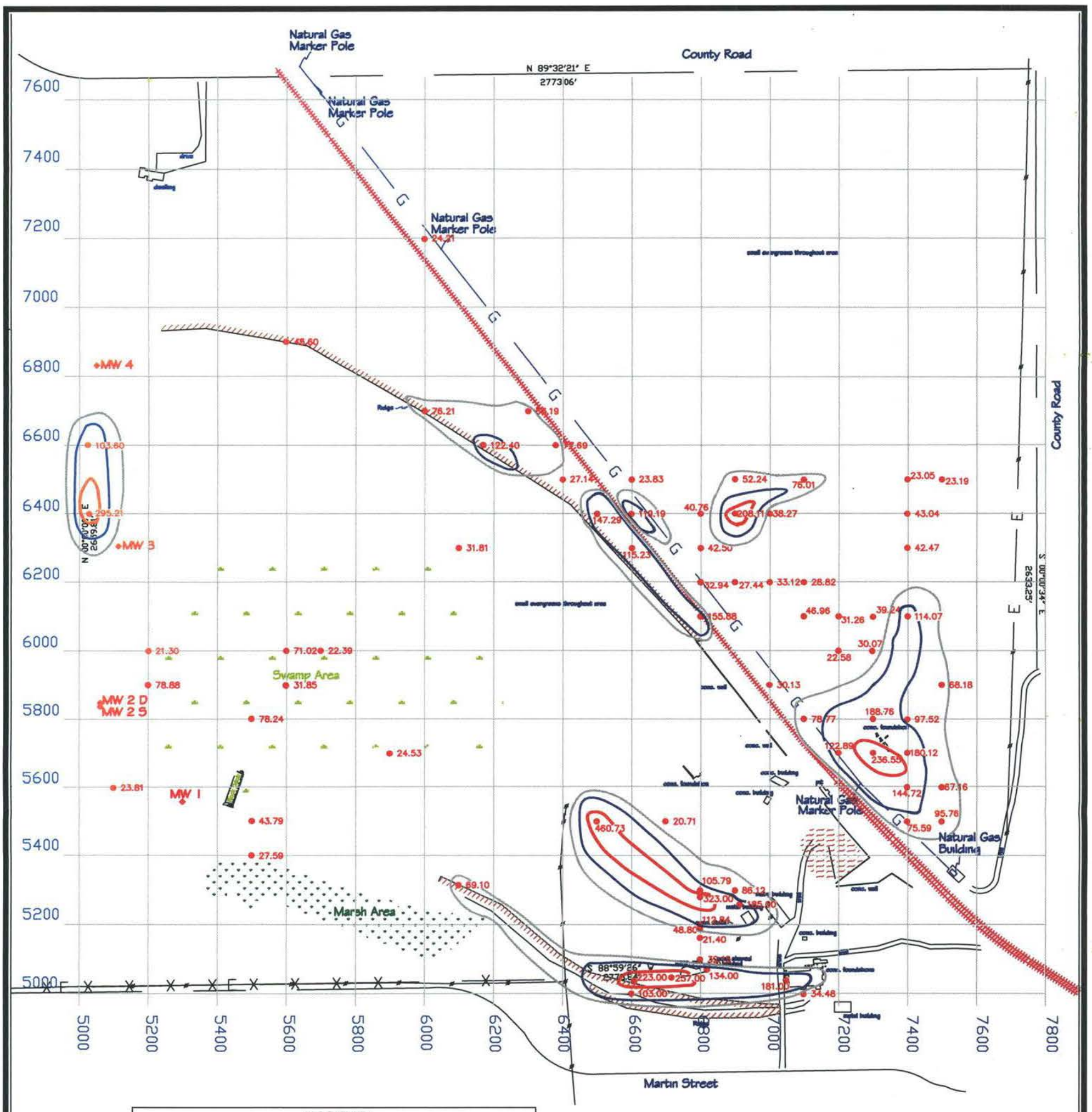
ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

KDHE LABORATORY RESULTS & ISOCONCENTRATIONS FOR LEAD
NATIONAL ZINC SITE, CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
1" = 300'	3-27-2002	3
APPROVED BY: AME	DRAWN BY: JDA	PROJECT NO.



LEGEND

- 43.79 = Sample Location & Concentration (mg/kg)
- = 50 mg/kg Isocontour
- = 100 mg/kg Isocontour
- = 200 mg/kg Isocontour
- = Lath Set
- Power Pole
- Tree Line
- Water
- Railroad
- E — Overhead Electric
- G — Underground Natural Gas

CADMIUM

RSK = 1000 mg/Kg

RSK = RISK BASED STANDARD FOR KANSAS

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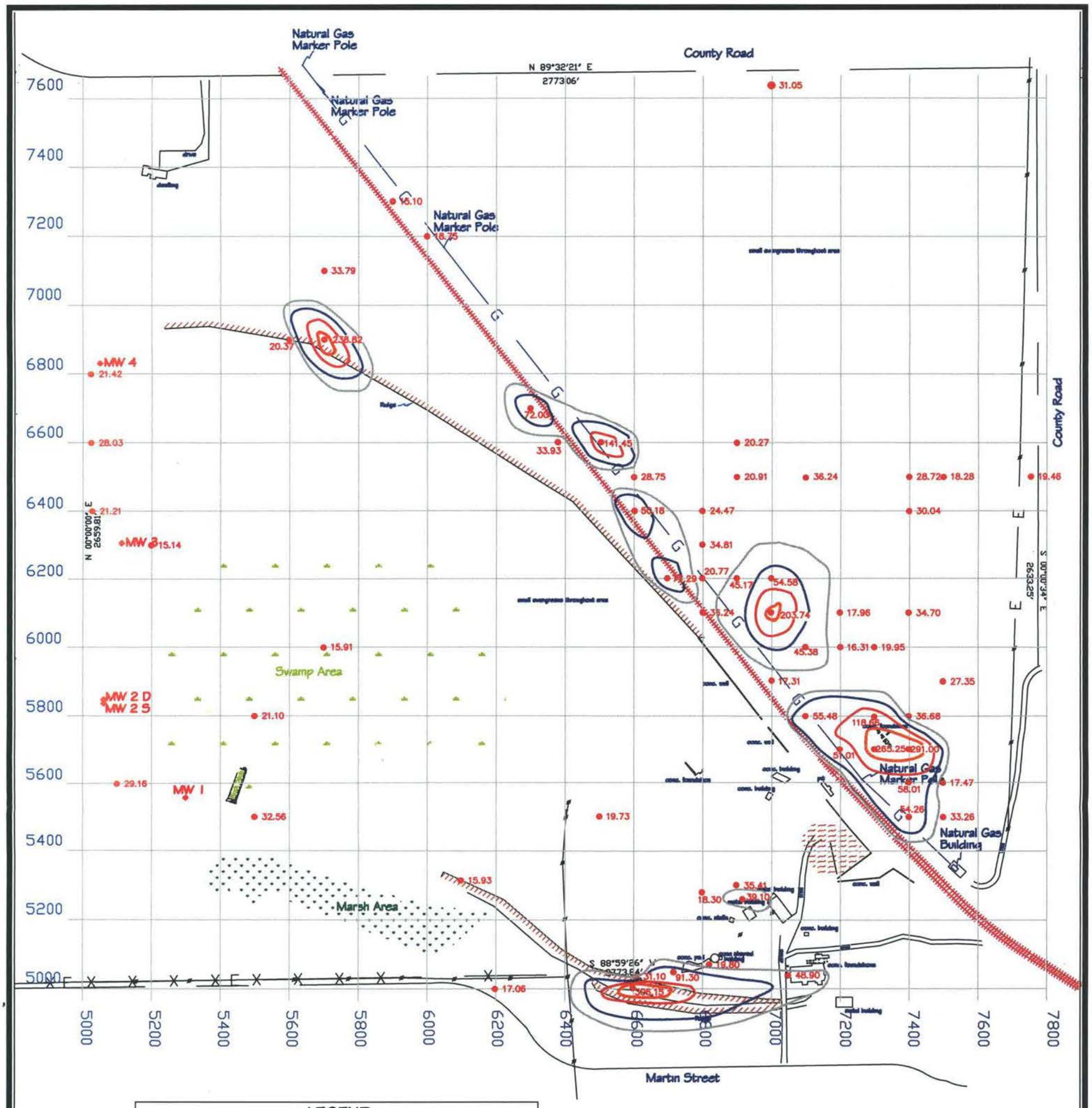
ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

KDHE LABORATORY RESULTS & ISOCONCENTRATIONS OF CADMIUM
NATIONAL ZINC SITE, CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
1" = 300'	3-27-2002	3-1
APPROVED BY: AME	DRAWN BY: GJJ	PROJECT NO.



LEGEND

- 17.06 = Sample Location & Concentration (mg/kg)
- = 38 mg/kg Isocontour
- = 50 mg/kg Isocontour
- = 100 mg/kg Isocontour
- = 200 mg/kg Isocontour
- = Lath Set
- Power Pole
- Tree Line
- Water
- Railroad
- E — Overhead Electric
- G — Underground Natural Gas

ARSENIC

RSK = 38 mg/Kg

RSK = RISK BASED STANDARD FOR KANSAS

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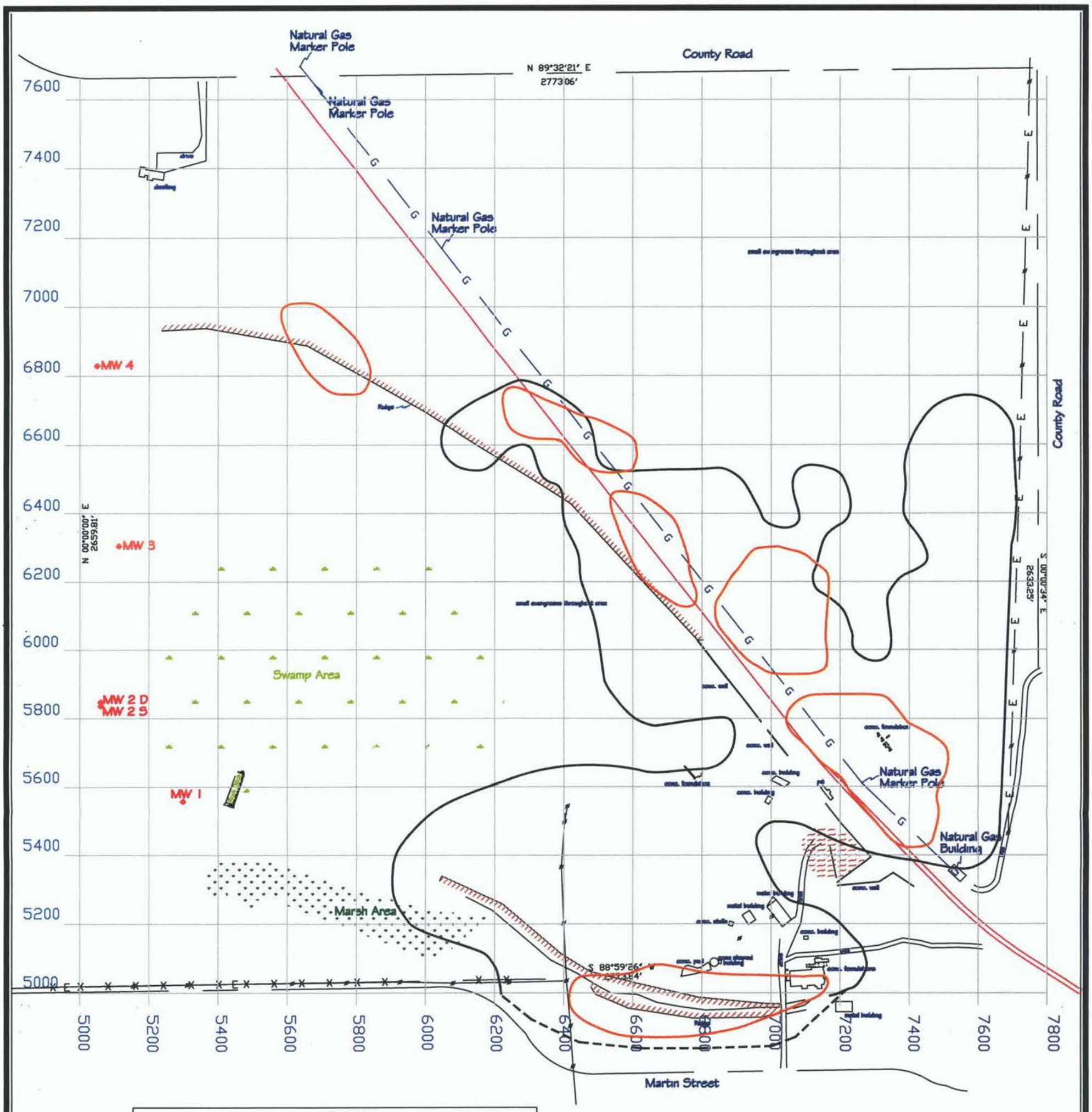
ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

KDHE LABORATORY RESULTS & ISOCONCENTRATIONS OF ARSENIC
NATIONAL ZINC SITE, CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
1" = 300'	9/10/2002	3-2
APPROVED BY: AME	DRAWN BY: GJJ	PROJECT NO.



LEGEND

= 1000 mg/kg or greater Lead Isocontour

= 38 mg/kg or greater Arsenic Isocontour

• = Lath Set

Power Pole

Tree Line

Water

Railroad

E — Overhead Electric

G — Underground Natural Gas

LEAD

RSK = 1000 mg/Kg

ARSENIC

RSK = 38 mg/Kg

RSK = RISK BASED STANDARD FOR KANSAS

(NONE OF THE SAMPLES EXCEEDED RSK 1000 mg/Kg FOR CADMIUM)

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

IMPACTED AREAS ABOVE THE RSK VALUES
NATIONAL ZINC SITE, CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
1" = 300'	9-11-02	3-3
APPROVED BY: AME	DRAWN BY: GJJ	PROJECT NO.

APPENDIX A

Hydrogeological Investigation Work Plan

CHERRYVALE NATIONAL ZINC SITE
HYDROGEOLOGICAL INVESTIGATION
WORK PLAN
CHERRYVALE, KANSAS

August 27, 2002

Prepared for

Salomon Smith Barney Holdings, Inc.

U.S. Steel Corporation

Prepared by

A & M Engineering and Environmental Services, Inc.
10010 East 16th Street
Tulsa, Oklahoma 74128
(918) 665-6575

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Appendix 2	Groundwater Sampling and Analysis Plan

CHERRYVALE
NATIONAL ZINC SITE
HYDROGEOLOGICAL INVESTIGATION
WORK PLAN

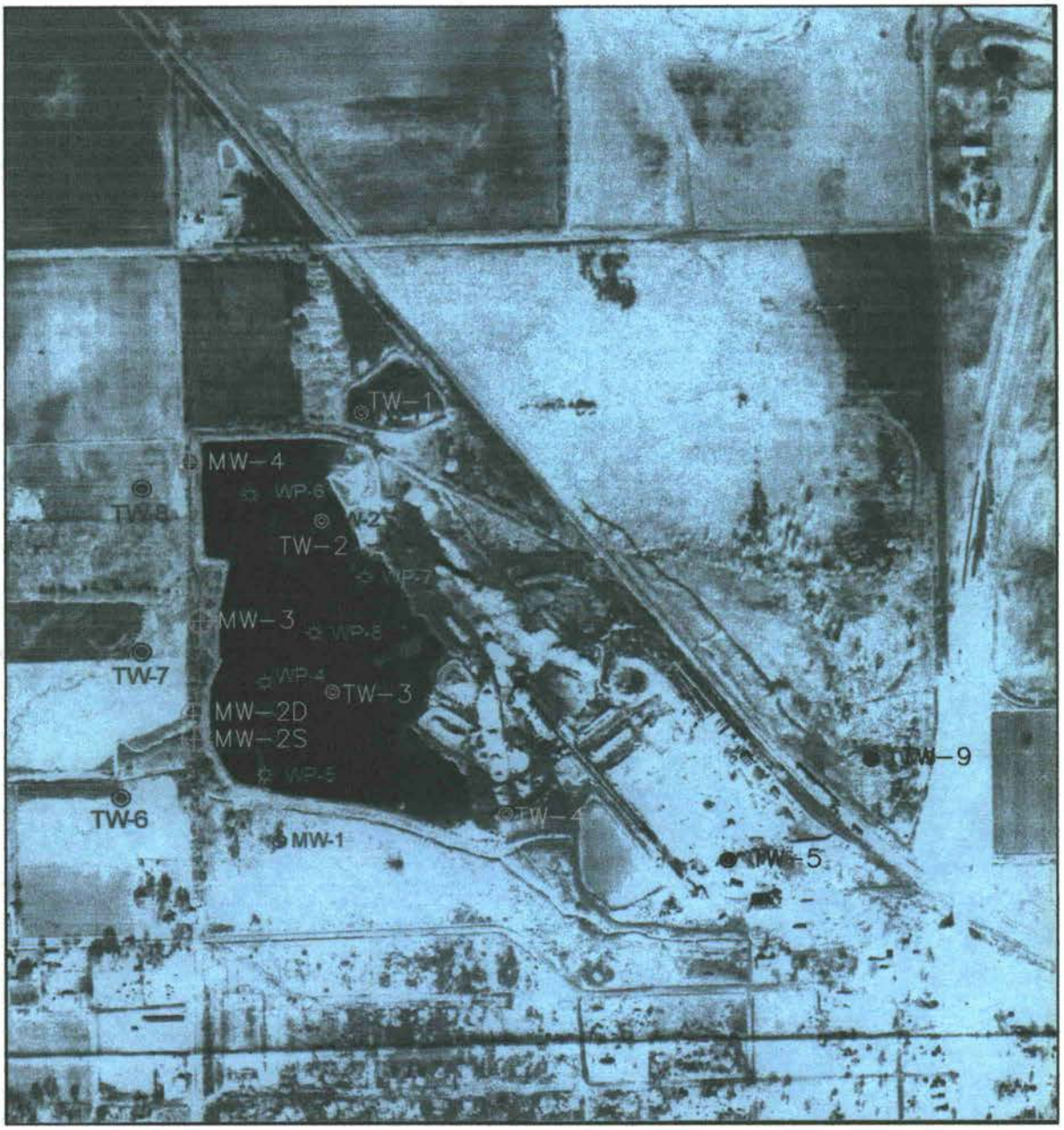
INTRODUCTION

Groundwater conditions at the former National Zinc site in Cherryvale, Kansas, are to be investigated to verify that groundwater contamination is not migrating off site. The proposed hydrogeologic investigation will address the groundwater flow and quality on site as well as off site and establish verifiable boundaries for contaminated groundwater. Data utilized in this investigation will include existing data in files and reports as well as new data.

BACKGROUND INFORMATION

The first series of soil tests and water levels was accomplished by Wichita Testing Laboratories as a lagoon embankment evaluation. These tests consisting of nine borings were completed in 1978. Data show a wet zone in silty clay at 7 to 12 feet, which overlies a limestone about 15 feet thick. Also in 1978, five monitor wells were drilled and completed. Each of these wells was drilled through the embankment and finished at depths from 12 to 19 feet, presumably at the base of the embankment fill. Three of these five wells (MW#2S, MW#2D and MW#4) were dry when measured on August 19, 1999. In August 1999, Kansas Department of Health and Environment (KDHE) drilled and completed nine test borings to obtain water quality data. The borings completed downgradient from the lagoon (TW-6, TW-7 and TW-8), as shown on Figure 1, were drilled to auger refusal and did not encounter the existing water table.

KDHE plugged TW-5, TW-6, TW-7 and TW-8 monitoring wells. TW-1, TW-2, TW-3, TW-4 and TW-9 are in place and in usable condition.



⊕ MW-1 MONITORING WELLS DRILLED IN 1978
◉ TW-6 TEMPORARY WELLS DRILLED BY KDHE IN 1999
☼ WP-5 WASTE PROFILE BORINGS DRILLED BY KDHE IN 1999

NOTE: TW-5,6,7,8 AND WP WELLS HAVE ALREADY BEEN PLUGGED

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ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

PREVIOUSLY DRILLED MONITORING WELLS AND BORINGS

NATIONAL ZINC FACILITY
CHERRYVALE, KANSAS

SCALE:	DATE:	FIGURE NO.
NOT TO SCALE	8/26/02	FIGURE 1
APPROVED BY: IT	DRAWN BY: GJJ	PROJECT NO.

OBJECTIVE

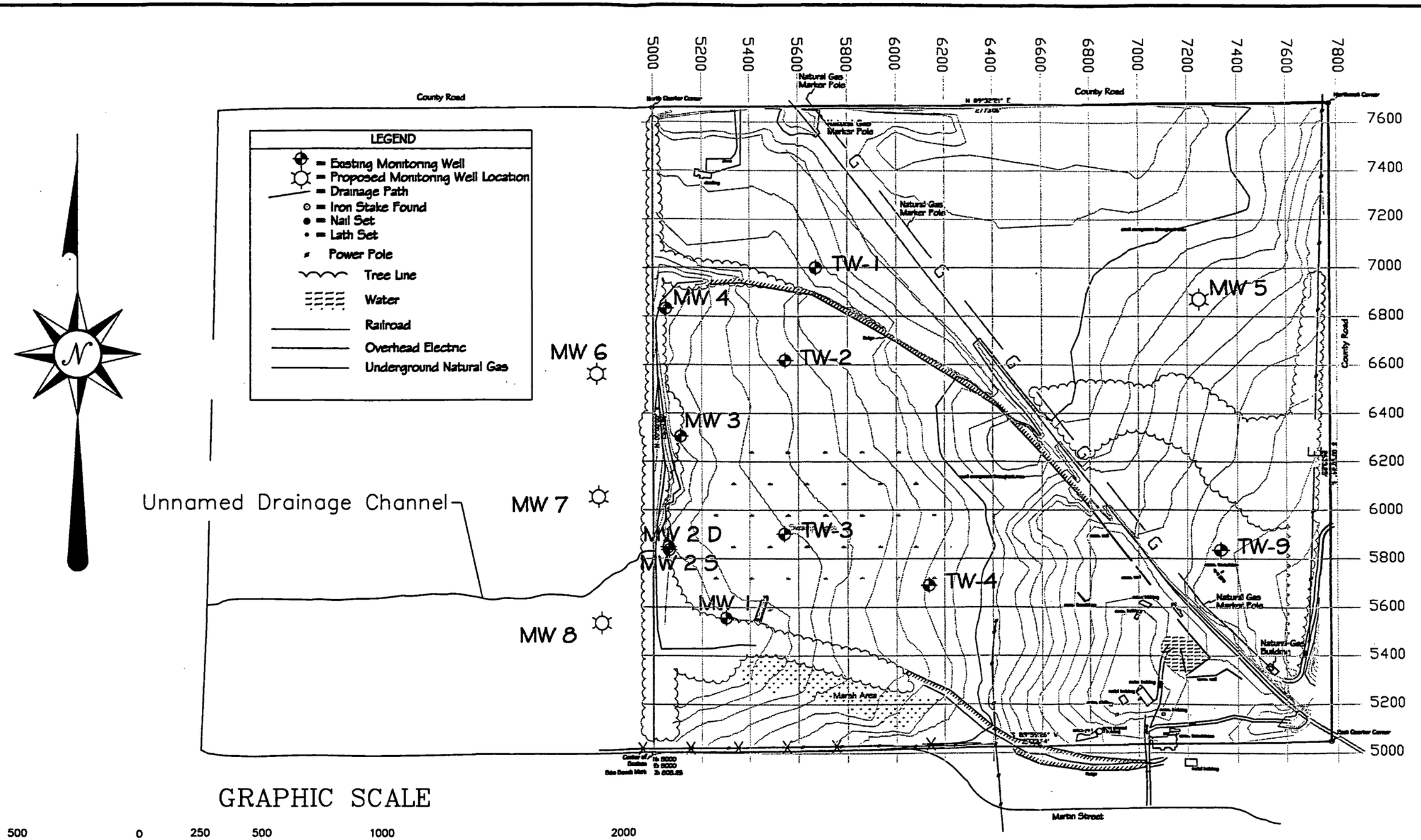
Based on existing data, it is believed that groundwater from the lagoon is not migrating off site. The purpose of this Work Plan is to confirm whether the groundwater indicated in on-site test borings is migrating and what contaminants, if any, are present in that water. To accomplish these tasks a series of monitor wells will be drilled and completed in the uppermost permeable water-bearing zone.

PROPOSED PLAN - MONITOR WELL LOCATIONS

The 1978 test borings for the embankment indicated a permeable zone in silty clay immediately overlying the weathered limestone. No borings in 1978 or 1999 have been finished in the limestone. The limestone at 15 to 20 feet is most likely the uppermost continuous permeable zone. The 1978 data indicated that this zone does contain water. Contaminated water in the lagoon area migrates downward through the silty clay to enter the limestone. If contaminated water migrates off site, most likely it does so through the limestone.

The hydrogeologic investigation will be accomplished by drilling and completing three monitor wells in the limestone downgradient (west) from the embankment. The locations for these three downgradient wells are shown on Figure 2.

Four wells (TW-1, TW-2, TW-3 and TW-4) were drilled and completed east of the berm in the general area of the fill and closed lagoon by KDHE. These wells were drilled to the top of the silty-clay, sandstone-rubble zone which is above the weathered limestone. These four wells will have water levels representative of the trapped water in the lagoon area. The chemical quality of this water was determined in 1999 by KDHE. This water was shown to be contaminated with certain toxic metals. These four wells will not be sampled and tested for the toxic metal contaminants of concern, but they will be measured for groundwater levels.



GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC. ENGINEERING – ENVIRONMENTAL – CONSTRUCTION	SCALE: 1"=500'	DATE: 8/23/02	FIGURE NO. 2	EXISTING AND PROPOSED MONITORING WELL LOCATION MAP NATIONAL ZINC SITE CHERRYVALE, KANSAS
	APPROVED BY: AME	DRAWN BY: GJJ	PROJECT NO.	

One new well will be drilled and completed east of the railroad tracks as shown on Figure 2. This upgradient well will be completed in the weathered limestone unit, as are the three downgradient wells.

The protocol of drilling and installation procedures for monitor wells is included in Appendix 1.

MONITOR WELL SAMPLING

All of the new and old monitor wells will provide water level elevations to be used to verify groundwater flow direction. Well water-level measurements will be taken monthly for a minimum of three months. Depending on evaluation of data from samples for those three months, further monthly sampling may be indicated for several additional months.

Chemical water quality samples will be taken from the four new wells monthly for three months. Each water sample will be tested for pH, Specific Conductivity, cadmium, lead, mercury, chromium, arsenic and silver. The KDHE tested the ten old wells, MW-1 through MW-4 on May 26, 1999, and TW-1 through TW-5 and TW-9 on August 25, 1999. At that time all wells had sufficient water for a sample. These data will be used for comparison with the new wells.

The Groundwater Sampling and Analysis Plan is included in Appendix 2.

PROPOSED DATA DISCUSSION

With the new water level data, an accurate groundwater flow may well be drawn. Hydraulic conductivity tests will be performed on the downgradient and upgradient limestone wells. No testing will be done on the in-lagoon wells as these wells will not penetrate the limestone, thus assuring no loss of low conductivity integrity of the clay layer over the limestone. With these data, rate and direction of flow will be established.

The water quality data will illustrate whether, as currently believed, water from the lagoon is not currently migrating off site, or if it is found to be migrating, where it is moving and what its chemical quality is.

APPENDIX 1

DRILLING AND INSTALLATION PROCEDURES FOR MONITOR WELLS

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Figure 2	Typical Well Completion Log Form	5

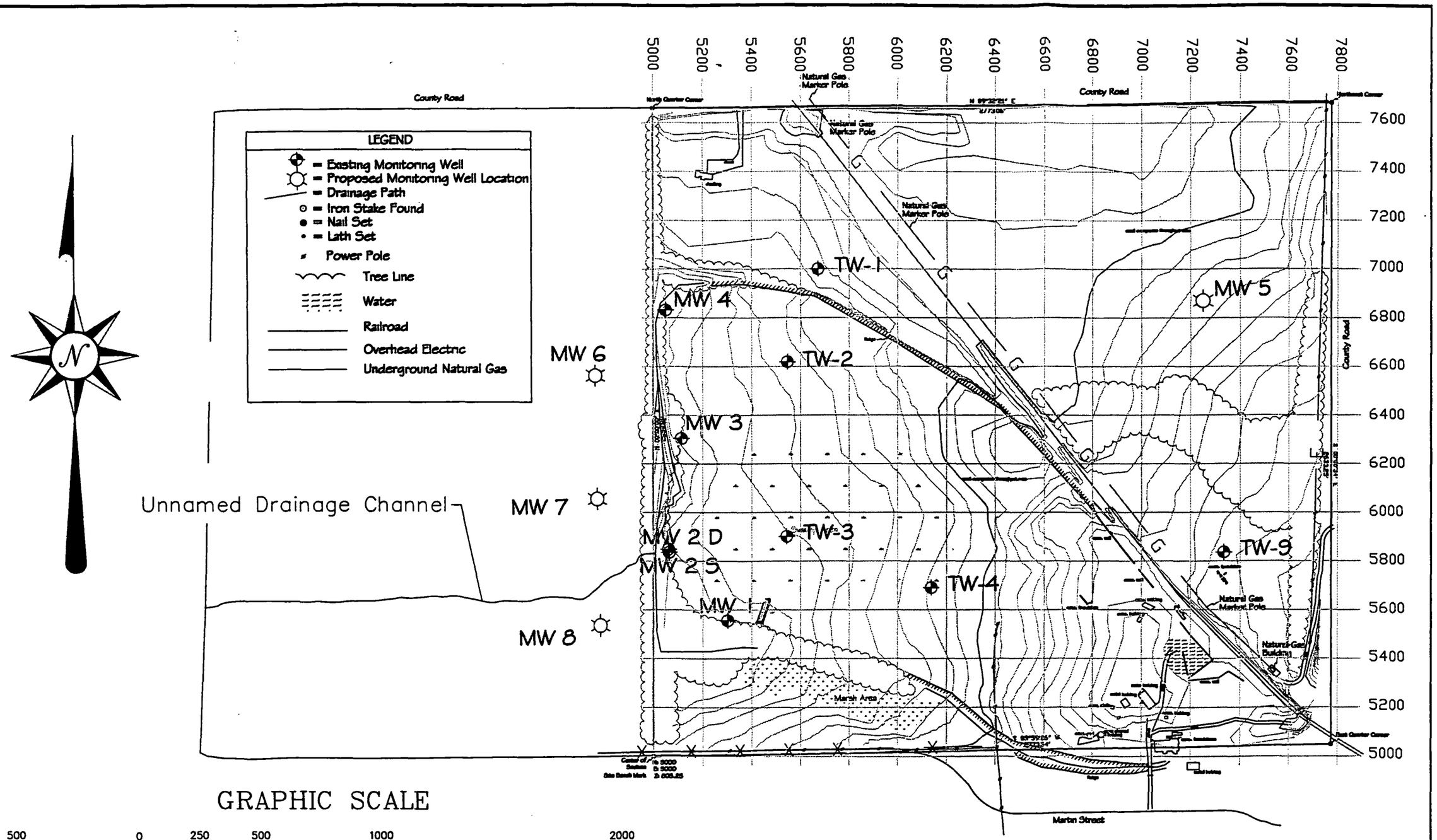
Monitoring Well Locations

For this project, four (4) new monitor wells will be installed. The first monitor well, designated MW-5, will be placed upgradient of the lagoon (northeast of the lagoon). Monitor wells MW-6, 7 and 8 will be located downgradient, west of the lagoon. Figure 1 depicts the approximate locations of the monitoring wells.

Monitoring Well Drilling

Monitor wells will be drilled using an auger or air rotary drill rig. The drilling auger will be used for boring the holes and removing encountered materials. The limestone section may require air rotary drilling. Each Monitor Well will be drilled into the uppermost aquifer to a depth of approximately 10-25 feet. The driller used for this project will be a Kansas certified monitoring well driller. Boring logs will be recorded for each Monitor Well location at the time of drilling by a Kansas Professional Geologist. At a minimum, boring logs will include:

- Project name and number
- Monitor well name/number
- Date and time of start and finish
- Weather conditions
- Geologist's name
- Driller's name
- Monitor well location
- Rig type bit size/auger size
- Depth to water
- Completion depth of monitor well
- Narrative description of encountered materials including:
    - Soil/rock type
    - Color and stain
    - Moisture content



GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	SCALE: 1"=500'	DATE: 8/23/02	FIGURE NO. 1	EXISTING AND PROPOSED MONITORING WELL LOCATION MAP NATIONAL ZINC SITE CHERRYVALE, KANSAS
ENGINEERING – ENVIRONMENTAL – CONSTRUCTION	APPROVED BY: AME	DRAWN BY: GJJ	PROJECT NO.	

    - Odor
    - Suspect contaminant
- Drilling observations including
    - Hole stability/caving
    - Advance rates
    - Drilling difficulties
- Equipment failures or other deviations from the drilling plan

Monitor Well Construction

After drilling, each well will be completed with 5 or 10 foot screen depending on uppermost groundwater depth. At least two feet of screen will be above the saturated zone (aquifer). The well casing for each monitor well will be PVC (Schedule 40) placed at least one foot above ground surface. The PVC casing and screen will have threaded joints with gasket seals. The filter pack will extend no more than three feet above the top of the well screen. The filter pack will be placed with a tremie pipe. Filter pack will be washed river sand with less than ten percent limestone, shale or sandstone. To seal the filter pack, bentonite pellets will be used. A minimum of two feet of certified sodium bentonite will be placed on top of the filter pack. Bentonite may be used to the surface. Cement with five percent bentonite will be prepared as a grout and placed over the bentonite seal with a tremie pipe up to ground surface. The monitoring wells will have locking caps. Since these wells are temporary monitor wells, no surface protector pipe and pad will be installed.

Monitoring Well Development

Well development will be accomplished by pumping or bailing each well. Before pumping or bailing, the pump or bailer will be thoroughly cleaned with a distilled water and Alconox mix and rinsed with distilled water, unless pre-cleaned disposable bailers

are used. The wells will be pumped or bailed until the water in each well is silt free. This determination will be a judgment decision by the well-site geologist.

Documentation of Monitor Well Construction and Completion

Each well will be surveyed for relative vertical elevation. A well completion log will be recorded for each monitoring well. Additionally, the driller will be required to complete and submit a monitoring well record form for each well and assign a number and submit to Kansas State Agency. An example of a typical well completion log form is provided as Figure 2.

COMPLETION LOG

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

		DRILLING METHOD:					PIEZOMETER NO.	
SITE NAME AND LOCATION							SHEET	
SEC T R		SAMPLING METHOD:					OF	
							DRILLING	
							START	FINISH
		WATER LEVEL					TIME	TIME
		TIME						
	G.L. ELEV.	DATE					DATE	DATE
DATUM	TOC ELEV.	CASING DEPTH						
DRILL RIG		SURFACE CONDITIONS			CASING DIA: 2"		SCREEN DIA: 2"	
ANGLE	BEARING						SLOT SIZE: .010	
SAMPLE HAMMER TORQUE	FT.-LBS							

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WELL CONSTRUCTION	NOTES
5								
0								
5								
10								
15								
20								
25								
30								
35								
40								
45								
50								

DRILLING CONTR _____

LOGGED BY _____

DATE _____ CHK'D BY _____

FIGURE 2

APPENDIX 2

GROUNDWATER SAMPLING

AND

ANALYSIS PLAN

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Prevention of Contamination Release	7
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Purging	8
Field Testing	8
Sample Collection	9
Sample Preservation	10
Sample Custody Documentation	10
Sample Labels	10
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PURPOSE

The purpose of the groundwater sampling and analysis is to ascertain the geochemistry of groundwater upgradient and downgradient of the former National Zinc facility, referred to as the "Site". Samples will be collected and analyzed for inorganic parameters.

QUALIFICATIONS OF SAMPLING PERSONNEL

The sampling will be directed by:

A & M Engineering and Environmental Services, Inc.
10010 East 16th Street
Tulsa, Oklahoma 74128
918-665-6575

Sampling personnel will consist of a Technician, Project Geologist, Health and Safety Officer and Project Manager. All on-site personnel, experienced in safety procedures and sampling of hazardous and non-hazardous materials, are trained under criteria set by 29 CFR 1910.120. This program instructs employees on general health and safety principles, proper operation of monitoring instruments, and the use of Personal Protective Equipment (PPE). Each employee also receives an eight hour annual update. The team consists of the personnel listed in Table 1, and will be assisted by field technician(s) under the supervision of a qualified team leader.

Table 1 : Field Sampling Personnel

NAME	AFFILIATION	TITLE
Irfan Taner PG	A & M Engineering	Project Geologist/Manager
Tony Mummolo	A & M Engineering	Chemist
David Anderson	A & M Engineering	Environmental Specialist
Jeff Elbert	A & M Engineering	Environmental Health & Safety
Jon Kuhn	A & M Engineering	Project Technician
Scott McReynolds	A & M Engineering	Project Technician
Ty Ertugrul	A & M Engineering	Environmental Specialist
Abby LaZar	A & M Engineering	Environmental Specialist

GROUNDWATER MONITORING SYSTEM

The former National Zinc facility (closed lagoon) has existing monitoring wells. The existing monitor wells are MW-1 through MW-4, TW-1 through TW-4 and TW-9. MW-1 through MW-4 wells are located on the western dike of the closed lagoon. TW-1 through TW-4 monitoring

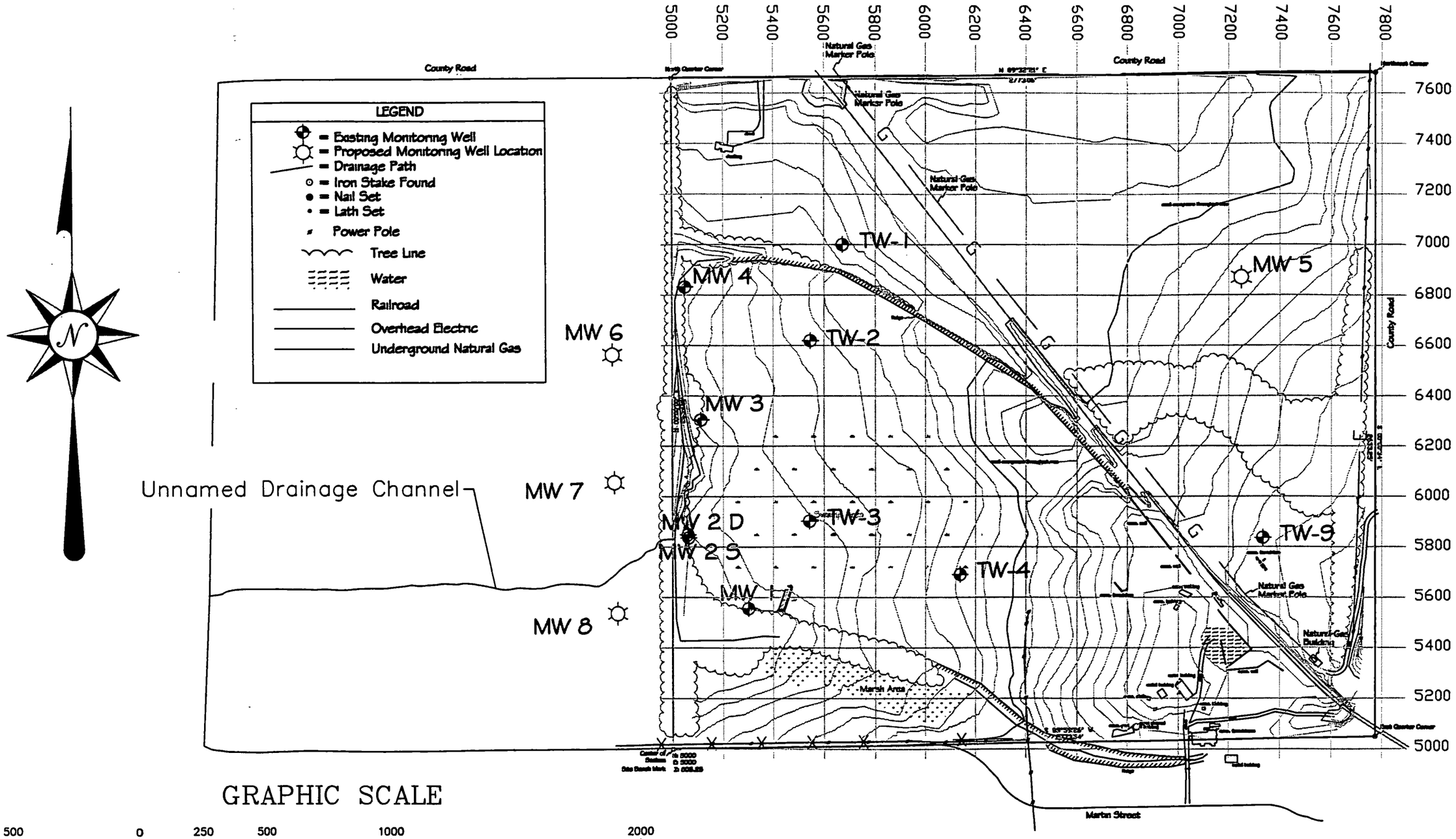
wells are located inside the former lagoon area. Also, there are four new proposed wells for the site. Figure 1 shows all the existing and the proposed monitor wells.

PARAMETERS

For each sampling event, the chemical constituents listed in Table 2 will be analyzed for each groundwater sample collected.

Table 2 : List of Parameters and Analytical Methods

PARAMETER	ANALYTICAL METHOD	PRACTICAL QUANTITATION LIMIT (PQL)(µg/l)
Specific Conductivity	EPA 120.1	N/A
pH	EPA 150.1	N/A
Arsenic	SW-846-6010	10
Cadmium	SW-846-6010	10
Lead	SW-846-6010	10
Chromium	SW-846-6010	10
Silver	SW-846-6010	10
Mercury	SW-846-7470-71	2



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

SCALE:	DATE:	FIGURE NO.	EXISTING AND PROPOSED MONITORING WELL LOCATION MAP NATIONAL ZINC SITE CHERRYVALE, KANSAS
1"=500'	8/23/02	1	
APPROVED BY: AME	DRAWN BY: GJJ	PROJECT NO.	

ORDER OF WELL VISITATION

To avoid cross contamination, well measurements will be taken starting with those wells with the least potential for contamination and proceeding to those wells with the highest potential for contamination. Well measurements will be taken at upgradient wells first, then downgradient wells, and finally the wells located inside the former lagoon area. Table 3 shows the proposed order of sampling.

Table 3 : Monitor Well Sampling Order

Sample Point Designation	Sample Point Identification
Upgradient Monitoring Well (MW)	MW-5, TW-9
Downgradient Monitoring Wells	MW-6, MW-7, MW-8
Existing Monitoring Wells	MW-1, MW-2S,D, MW-3, MW-4
Monitoring Wells in former Lagoon Area	TW-1, TW-2, TW-3, TW-4

RECORDKEEPING

The Field Sampling Team will maintain a compendium of Field Data Sheets. The Field Data Sheet shown in Figure 2 provide a permanent record of information about monitoring activities at each sample point.

After entering the general information the team recordkeeper will note the condition of the well, including whether or not the lock was in place, any evidence of tampering, if there is any water standing near the well, and the condition of the concrete well pad.

Upon arrival at each well on the schedule, the team recordkeeper will record the following on the Field Data Sheets:

- Date and time of water level measurements, temperature and weather data
- Persons present
- Well ID and condition of well
- Depth to water and technique used to measure
- Presence of immiscible layer and detection method
- Total Well depth
- Time well purged
- Well evacuation procedure/equipment, if different from plan
- Purge volume
- Time well sampled
- Sample withdrawal procedure/equipment, if different from plan
- Sampling sequence
- Preservatives used (if any)
- Field observations

Figure 2: Field Data Sheet

FIELD WATER QUALITY SAMPLING AND ANAYLSIS DATA SHEET

PROJECT NAME:_____ **PROJECT NO:**_____

SAMPLER NAME:_____ **PERSON PRESENT:**_____

WEATHER:_____ **AIR TEMP:**_____ **LAST PRECIPT.**_____

LOCATION (STATION NO.)								
DATE AND TIME WATER LEVEL MEASURED								
DATE AND TIME PURGED								
DATE AND TIME SAMPLED								
SAMPLING METHOD								
TOP OF CASING ELEV.								
DEPTH TO WATER (DTW)								
TOTAL DEPTH (TD)								
REQUIRED PURGE VOLUME								
VOLUME PURGED								
THICKNESS OF NAPL/DNAPL								
SUBSTANCE ON WATER								
SAMPLING TEMP.								
SAMPLING PH								
(INST. NAME)								
SAMPLING SPEC. COND								
(INST. NAME)								
COLOR								
ODOR								
SEDIMENT								
FIELD TREATMENT PRESERVATION								
PURGING/SAMPLING PLAN AND PROCEDURES FOLLOWED?								

NOTE:_____

Volume calculation: 2" – 0.163 gal/ft, 3" – 0.367 gal/ft, 4" – 0.653 gal/ft **{[(TD-DTW) x gal/ft] x 3} + 3.5 gal = volume to evac.**

FIELD ACTIVITIES

General Procedural Outline For Sampling

1) Decontaminate all field sampling equipment
2) Arrive on location, Prepare well location for sampling
3) Measure water level
4) Measure total well depth
5) Purge three well volumes testing pH and Specific Conductance
6) Collect samples testing pH and Specific Conductance
7) Decontaminate all equipment
8) Collect field blank and equipment blank samples
9) Preserve and label samples
10) Decontaminate all equipment
11) Prepare chain-of-custody
12) Transport or ship to laboratory
13) Sign chain-of-custody with laboratory

Decontamination

With the exception of disposable polyethylene bailers, all equipment used to collect groundwater samples, whether new or previously used, is assumed to be contaminated and undergoes the level of decontamination appropriate to its intended use and construction.

Prior to each sampling event, all equipment to be used during the sampling of groundwater and surface water and sediments will be decontaminated under laboratory conditions to ensure that no contaminants are inadvertently introduced into the samples collected.

Once field sampling begins, sampling equipment will be decontaminated between each sampling point by thorough washing in a non-phosphate detergent followed by triple rinse in distilled or de-ionized water. All rinsate will be collected and disposed properly.

The analytical laboratory will provide pre-cleaned sample containers which have been pre-preserved for monitor well groundwater samples.

Disposable polyethylene bailers may be used for collection of groundwater sampling. Sampling bailers will be factory decontaminated and sealed in plastic until opened for use in sample collection. Used bailers and disposable ancillary sampling equipment will be collected and stored for proper disposal.

Prevention of Contamination Release

To avoid a release of potentially contaminated groundwater, a protective layer of 6 mil polyethylene sheeting will be spread around the monitor well to collect any spillage during purging and sampling. Five gallon capacity plastic buckets will be used to collect rinse and decontamination water during field measurement and sampling. At each groundwater monitoring well in the former lagoon monitor wells, a 55 gallon capacity drum will be used to store rinse water, decontamination water and purge water from the well. Purge water and excess sampled water will be disposed in the groundwater treatment system of the City of Cherryvale.

Water Level and Total Depth Readings

Water level and total depth readings for each well will be taken at each sampling event. The designated team member will put on clean nitrile gloves and proceed as follows:

a. Grasp the monitor well cap with both hands and gently remove. Care must be taken to not let the lid (cap) touch anything while being placed on a clean sheet of polyethylene out of the sampler's work area.

b. The team leader will rinse the cable and probe of the depth meter with de-ionized (DI) or distilled water and collect the rinse water in a five gallon plastic bucket. Slowly the team leader will lower the depth indicator probe into the well until the meter indicates that water has been reached. Using the permanent measuring point designated on the casing, the depth at which the water was encountered will be mentally noted (the meter will be read to the nearest 0.01 ft.). Raise the probe until it is no longer in the water and lower the probe again until the meter indicates that water has been reached and mentally note the second value. If the values do not agree within 0.01 ft., repeat the steps as above until the two readings agree within 0.01 ft.. Once a stable depth to water reading has been confirmed, the depth-to-water value will be recorded on the Field Data Sheet.

c. Slowly lower the depth sounder into the well until it hits the bottom of the well. Read and mentally note the depth when tension in the cable is relieved as the weighted end touches the bottom of the well. Raise the probe above the bottom and then lower it again to the bottom to take an independent reading. If both readings are the same, record the value; if not, take an additional reading. Readings will be recorded to the nearest 0.01 ft. as measured from the permanent measuring point designated on the casing.

d. Slowly remove the probe from the well and decontaminate using a triple rinse with the DI water as it is removed. If organic contamination is suspected in the monitor well, decontamination of the water level indicator will include thorough washing with an Alconox soap solution before rinsing with DI water. During decontamination, the sampler will be careful to collect all rinsate water while not to allowing any rinse water to run down the well. The sampling team should be

absolutely sure the wire or probe never touches the ground or anything other than the water in the well.

e. Prior to covering the well, the well lid (cap) should be rinsed with distilled water. Then place the cap securely back onto the well stem.

f. Secure the locking protective well cover and proceed to the next monitor well in the circuit.

g. Transfer rinse water from the five gallon buckets to the 55 gallon drum for disposal in the groundwater treatment system equalization tank.

Purging

Three well volumes of water will be pumped from each well prior to sampling. The designated well pump is a Grundfos BMI / MP-1-115V. One well volume is equal to the amount of water held in the well bore and in the filter pack. A 10-foot filter pack will contain approximately 3.0 gallons of water (considering 20 percent specific yield of filter pack). The factor for 2-inch diameter pipe is 0.163 gallons per foot of water in the well. The amount of water in the filter pack is added to the amount of water in three times the casing volume for total amount of purgate.

The purge volume will be calculated in the field for each well by the following method:

Measure depth to water (static water level - SWL)
Measure depth to bottom of hole (total depth - TD)
[(TD-SWL) X 0.163 gal/foot X 3] + gravel pack H_2O = purge volume

Purging the well will be accomplished using a pump or bailer for removing the required quantity of water. Groundwater purged from the well prior to sampling will be placed in a 55 gallon drum. Stored purge and decontamination water will be properly disposed in the approved groundwater treatment system equalization tank.

Field Testing

Field analyses consisting of Temperature, Specific Conductance and pH will be conducted before the well is purged and at intervals (at least 3 times) during purging to ensure the water to be sampled is representative of the formation water and not impacted by static conditions in the well casing or gravel pack. Regardless of the number of well volumes removed, the purging will continue until field analyses are stable, or the well is "pumped dry". All field measurements will be recorded on the Field Data Sheet.

After purging, field measurements of temperature, pH and Specific Conductance will be made. Then as laboratory samples are collected, additional replicate samples will be collected and tested for temperature, pH and Specific Conductivity. A total of four replicate field measurements will be

made at the surface during laboratory sample collection Replicates will be tested in glass containers which are rinsed thoroughly between replicate tests.

Sample Collection

Groundwater samples will be collected using disposable polyethylene bailers and disposable nylon cord. Two field technicians will be responsible for sample collection and a third will complete the recordkeeping and labeling requirements. The two samplers will don clean nitrile examination gloves before removing the bailer from the protective plastic bag. The top of the bag will be opened to allow attachment of the disposable nylon cord to the bailer. Once the cord is securely attached the bailer will be removed from it's protective cover and slowly lowered into the well casing. As the bailer slowly contacts the water surface, it will be lowered very slowly approximately twelve inches and then withdrawn from the well casing. The water column in the bailer will be checked for indications of an immiscible layer of light non-aqueous phase liquid (LNAPL) on the water surface.

If LNAPL's are indicated, the bailer will be carefully discharged into a 40 ml Volatile Organics and Aromatics (VOA) vial with a Teflon septum designed for collection of volatile organic samples in water. The VOA vial would then be immediately labeled and place in the pre-chilled ice chest to be delivered to the analytical laboratory.

If there is no indication of LNAPL's, the contents of the bailer would be used for the first replicate sample for field Measurement of Temperature, pH and Specific Conductivity. Following bailer discharge, the bailer would then be lowered slowly down into the well casing to the water surface. The bailer will be very slowly lowered into the water completely to the bottom of the well casing. once on the bottom of the well, the bailer will be slowly withdrawn and the water column checked for indications of a dense non-aqueous phase liquid (DNAPL) which would accumulate on the bottom of the water table just above the aquifer confining bed or zone.

If there is no indication of DNAPLs, the bailer would be used for the fourth replicate sample for field measurement of temperature, pH and specific conductivity. Following bailer discharge, the bailer will then be lowered down into the well casing and filled with water for laboratory samples.

The samples from each well will be collected in the order and quantity shown in Table 3:

Table 4 : Order of Sample Collection

Parameter	Container	Quantity
Metals	Glass with acid preservative	1000 ml
pH and specific conductance	Glass	250 ml

Note: At least one duplicate and one equipment blank per sampling event will be included with the samples.

In accordance with the above, two separate containers will be used for each well. At the conclusion of taking the designated samples for the laboratory, the fourth and final replicate pH, temperature and Specific Conductance will again be analyzed at the well and recorded on the Field Data Sheet.

Sample Preservation

Containers designed for each group of parameters to be analyzed will be provided by the analytical laboratory. These containers will have the appropriate preservative already in the container, and labeled with the type of preservative used. Once collected and labeled, the samples will be placed in an ice chest, pre-chilled to 4° Centigrade.

Sample Custody Documentation

The chain-of-custody requirements for groundwater sampling are outlined in the following sections. These sections include a description of the minimum information requirements for:

- Sample labels
- Sample seals
- Chain-of-custody record
- Sample transportation

Sample Labels

The primary function of the sample label is to prevent misidentification of samples. The sample label will be completed using a waterproof ink marker. It will be firmly affixed to the sample container. Even if the label has a self-adhesive back, it is recommended that transparent cellophane tape be applied over the label to ensure it is not dislodged during shipping and handling.

Sample Seal

If a common carrier will be used to transport samples to the contract laboratory, seals will be used to ensure that samples have not been disturbed during transportation. Two-inch nylon reinforced packing tape will be used to seal individual sample containers. As a further precaution, a custody seal, signed and dated by the designated recordkeeper, may be affixed over the tape and/or to the sealed ice chest.

Chain-of-Custody Record

All samples must be accompanied by chain-of-custody forms. The chain-of-custody record provides the necessary documentation to track sample possession from time of collection through analysis. Figure 3 illustrates the chain-of-custody form to be utilized by the field sampling team.

The chain-of-custody documentation will include, at a minimum, the date, time and conditions under which the samples were collected along with the preservation techniques and the shipping data. The original chain-of-custody record will be sealed in a watertight pouch and placed in one of the sample coolers just before it is closed and sealed. A copy of the chain-of-custody report will be placed in the sampling logbook.

Sample Transportation

After collection of groundwater samples, the sample containers will be packed into plastic coolers lined with plastic bags. Sample bottles will be suitably packed to avoid breakage. The temperature in each cooler will be maintained at 4 degrees C by ice or two large, frozen "blue ice" packs. After packing, the shipping coolers shall be secured closed and may be sealed with custody seals. The groundwater samples shall be delivered the day of collection to the laboratory for analysis.

FIGURE 3

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

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

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER

PROJECT NUMBER	PROJECT NAME

SAMPLERS: (Signature)

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP	GRAB	STATION LOCATION	MATRIX	NO OF CONTAINERS	RUSH ? YES	RUSH ? NO												REMARKS

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	REMARKS:

CHAIN DWG

QUALITY ASSURANCE/QUALITY CONTROL

Field and Sampling

The field quality control program is the responsibility of the sampling company and the laboratory. The laboratory will supply a sufficient number of containers for each group of parameters to be analyzed. One set of bottles of each type will be filled with reagent grade deionized water and transported to the field sampling location and returned to the laboratory.

The field equipment, such as pH meter and Specific Conductance meter, will be calibrated prior to transport to the field, and once in the field, instruments will be calibrated at a minimum of once per day. The pH meter is calibrated with prepared solutions as is the Specific Conductance meter. An equipment blank will be collected to ensure that any non-dedicated sampling equipment has been cleaned. To collect, run reagent-grade water through all equipment and transfer water to sample bottles. Samples will be subjected to same analyses as well samples.

Laboratory QA/QC Procedures

The laboratory has the responsibility of providing quality control within the laboratory. The laboratory has presented a QA/QC program prior to initiation of implementation of sampling and analysis. The plan provides for the use of standard, laboratory blanks, duplicates and spiked samples for calibration and identification of potential matrix interferences.

Laboratory control requirements for this project will include:

1) System performance checks
2) Continuing calibration checks
3) Method blank analysis
4) Interval standard area and retention time monitoring
5) Matrix spike/duplicates
6) Surrogate spikes
7) Criteria for qualitative identification

Specifically, the above are described by Fisk (1986) in ASTM STO 925. Data form QC samples will be used as a measure of performance and as an indicator of possible cross-contamination.

APPENDIX B

Soil, Sediment, and Water Sampling and Analysis Plan

Soil, Sediment and Water

Sampling and Analysis Plan

Introduction 1

Soil Sample Collection 1

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Laboratory QC/QA 13

Introduction

Relevant sections of the following sampling plan will be implemented for soil, sediment and water samples collected throughout the completion of field activities associated with site assessment performed at the National Zinc Site, Cherryvale Kansas. At the completion of sampling and analyses associated with this plan, a complete report of findings will be issued.

The Phase 1 work plan includes the following sampling events:

1. Soil samples to be collected at EPA's disposal site.
2. Sediment samples to be collected along the unnamed creek (discrete samples to be collected) and in Drum Creek (composite samples to be collected).
3. Surface water samples will be collected from the unnamed creek and in Drum Creek (when standing water or surface water is encountered).

This Plan outlines the methods and procedures that will be used by A & M Engineering for collection, preservation, transportation and analysis of the samples collected during the implementation of the Phase 1 work plan.

Soil Sample Collection

Introduction

The contaminated soils removed by the EPA from residential areas impacted by the National Zinc site operations in Cherryvale, Kansas were brought and disposed at the plant site. This site is referred to in this plan as EPA's disposal site. EPA was scheduled to survey the site on August 27, 2002 and supply the land survey and information to the respondents (Salomon Smith Barney and U.S. Steel) when available. When the respondents receive this information, A & M Engineering will plot the location of EPA's disposal site on existing site base maps and samples will be collected from the EPA disposal site area. The purpose of the sampling to be conducted by A & M Engineering is to obtain sufficient information on the Lead, Arsenic and Cadmium levels in the contaminated soils within EPA's disposal site to determine if deed restrictions will be warranted and to aid in the design of an appropriate clay cap for the disposal site.

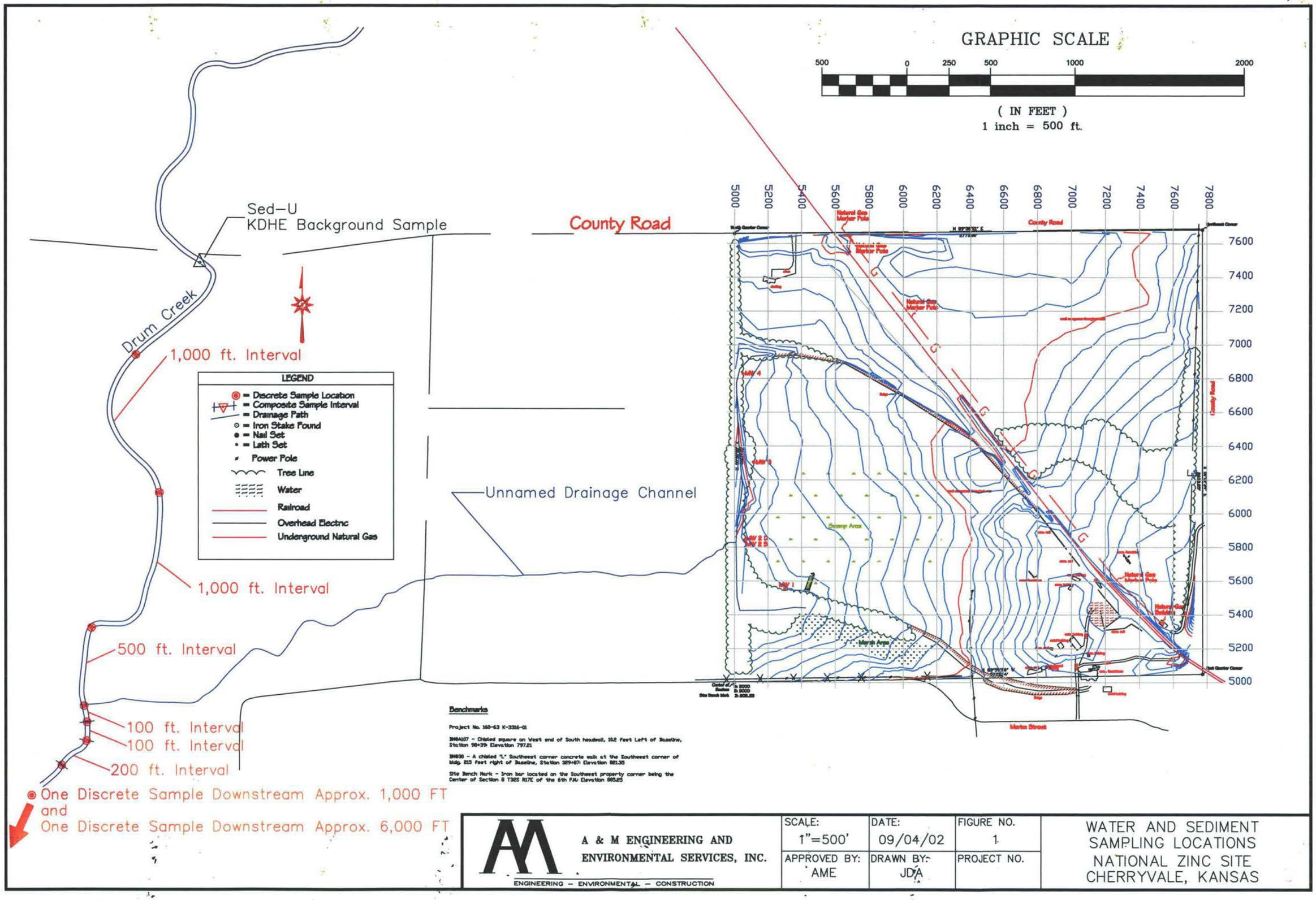
Sample Locations

The EPA's disposal site will be divided into grids with 50 foot intervals. The grid system to be developed for the EPA's disposal site will be coordinated very closely with the grid system shown in Figure 1 which is based on 100 foot intervals. From each 50' x 50' grid, two samples will be taken and composited into one sample. When the land survey information to be developed by the EPA is made available to A & M Engineering, that data will be plotted to show the location of the EPA disposal site on Figure 1 along with the proposed grid system for sampling.

The following describes the protocol which will be followed during sediment sample collection.

Sample Depth

At each sampling point (two samples from each 50' x 50' grid) soil will be collected from 8" below the surface to 36" below the surface. This sample interval will represent the top 28" segment of the disposed contaminated soil. The total depth of contaminated soil is anticipated to be around 3 feet.



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING – ENVIRONMENTAL – CONSTRUCTION

SCALE:	DATE:	FIGURE NO.
1"=500'	09/04/02	1
APPROVED BY: AME	DRAWN BY: JDA	PROJECT NO.

WATER AND SEDIMENT SAMPLING LOCATIONS
NATIONAL ZINC SITE
CHERRYVALE, KANSAS

Sampling Tools

1. Sediment sampling device may be any of the following:
   a. Tube-type soil sampler(s) fitted with a 6-inch to 12-inch sampling tube
   b. Stainless steel or plastic spoon or trowel
   c. Sharpshooter type shovel
2. Nitrile or vinyl gloves to be worn by samplers during any activities which involve contact with the sediment samples.
3. Plastic or stainless steel tools and tubs for sample compositing.
4. Pre-cleaned wide-mouth 500ml glass containers with Teflon lined lids for composite sample retention.
5. Distilled or de-ionized water for decontamination of equipment.
6. Alconox soap for decontamination of equipment.

Personal Protective Equipment

Field personnel will be equipped with the following personal protective equipment:

1. Hard hat
2. Safety glasses
3. Rubber boots
4. Nitrile or Vinyl gloves

Nitrile or Vinyl gloves and disposable sampling tools will be placed in a plastic trash bag for disposal after use. At the conclusion of sampling, liquid wastes (Alconox solution, rinse water) will be transported to the site for disposal.

Sampling Protocol

Sampling of soil within the EPA's disposal site will be conducted using the following protocol:

1. Grab sample locations based upon two grabs per 50' x 50' grid will be identified on the site base map by North and East coordinates from the survey grid provided by EPA. The locations will be transferred to the EPA's disposal site for sampling by field survey.
2. Sampling staff will don clean Nitrile or vinyl gloves. Thoroughly clean the soil sampler (particularly the sampling tube) and plastic wash tubs with Alconox/distilled or de-ionized water mixture and rinse with distilled or de-ionized water.
3. At each grab sample location, the soil surface will be penetrated approximately 8-inches deep with the tube type soil sampler. This top 8-inch segment will be discarded as clean cover soil. The tube type soil sampler will reenter the original hole and a grab sample will be obtained from the 8-inch to 36-inch zone. This process will be repeated within a two foot radius of the original location until a sample about 500 ml in volume has been recovered from the location. The 500 ml grab sample will be placed in a clean mixing tub. A second grab sample will be collected from the other previously marked location within that sample grid and placed in the clean mixing tub

   When both grab samples from a 50' x 50' grid have been obtained, the grab samples will be mixed in a tub to form a composite sample. The composite sample will be split two (2) ways with one split sent to the laboratory for analysis while one split will be retained for archive. The sample splits will be placed in separate labeled glass 500-ml capacity jars and placed in coolers for shipment to the laboratory and one set of split samples will be maintained in the samplers custody.

A soil sampling log will be maintained by the sampling team for future reference (Figure 2) and entries will be made in the Field Notebook.

4. Sampling team members will then clean the soil sampler(s), plastic tubs and plastic tools with Alconox and distilled or de-ionized water. Sampling team members will don clean Nitrile gloves prior to continuing with sampling.
5. The above sampling sequence will be followed for each of the remaining sample grids of the EPA's disposal site.
6. At conclusion of sampling, conduct final decontamination of sampling equipment and reusable personal protective equipment.

Decontamination Procedures

Decontamination procedures will consist of the following:

1. Sampling team members will don clean Nitrile gloves prior to initiating sampling and after each composite sample has been obtained.
2. The soil sampling tool will be cleaned with a brush and a solution of Alconox prior to beginning sampling and after each composite sample has been obtained. Particular attention will be paid to any portion of the sampling tool with cracks, crevices or an irregular surface which might trap contaminated material. The sampling tool will then be rinsed with distilled or de-ionized water and, if necessary, dried with a clean paper towel.
3. After sampling is complete, reusable personal protective equipment (i.e. boots) will be washed with an Alconox soap solution and scrub brush, followed by thorough rinsing with de-ionized water.

Preservation Procedures

Since the only constituents of concern associated with this sampling effort are metals, no preservatives are required. The samples will be placed in the glass 500-ml sample jars in coolers while in transit to the laboratory. One set of split samples will be retained by the sampling team for additional analyses should it be deemed necessary or desirable at a later date.

Labeling; Chain of Custody

A label with the following information will be affixed to each sample jar:

- Name of Sampling Firm
- Initials of Sampler
- Client/Source
- Site Name
- Sample Identification
- Identified as Grab (Discrete) or Composite
- Date of Sample Collection
- Time of Sample Collection
- Preservatives (if used)
- Analyses requested to be performed by Laboratory

The chain of custody form (Figure 3) will be completed and submitted with the samples and procedures outlined in EPA SW-846 followed throughout delivery of samples to the analytical laboratory.

Figure 2 Soil Sampling Log

A & M Engineering
10010 East 16th Street
Tulsa, OK 74128

SAMPLING LOG

Project Name:	
Site Location:	
Project Number:	

Sampling Date:	
Sampler Name:	
Doc. Control No:	

SAMPLE NUMBER	SAMPLE LOCATION	MATERIAL DESCRIPTION (include color, odor ect.)	NO.OF GRABS & VOLUME	TOTAL VOLUME

Chain of Custody #:	
Grid Cell Cross Section #:	
Site Sampling Plan Dwg. #:	

Signature

_____ **Date:** _____

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

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

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A & M Engineering	Irfan Taner	918-665-6575

PROJECT NUMBER	PROJECT NAME
1234-123	A & M Engineering

SAMPLERS: *(Signature)*

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO													REMARKS

RELINQUISHED BY: *(Signature)*	DATE	TIME	RECEIVED BY: *(Signature)*	RELINQUISHED BY: *(Signature)*	DATE	TIME	RECEIVED BY: *(Signature)*
RELINQUISHED BY: *(Signature)*	DATE	TIME	RECEIVED BY: *(Signature)*	RELINQUISHED BY: *(Signature)*	DATE	TIME	RECEIVED BY: *(Signature)*
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CHAIN DW

Sediment Sample Collection

Introduction

As part of the National Zinc Site characterization, the unnamed creek downgradient of the former lagoon area and Drum Creek will be tested and analyzed to determine the extent and magnitude of offsite migration of contaminants. To provide credible and defensible results, a defined plan for sample collection and analysis has been developed.

Review of the previously conducted site assessments indicated that the unnamed creek contained sediments contaminated with Lead, Cadmium and Arsenic. The previously conducted sampling on Drum Creek showed contamination at the confluence of the unnamed creek with Drum Creek. Respondents are proposing to collect sediment and water samples from both creeks.

Sample Locations

Sediment Sample Collection in the Unnamed Creek

A & M Engineering will conduct a thorough survey of the sediments in the unnamed creek in order to develop a map of sediments and volume information on the sediments requiring removal from the drainage path. Information to be gathered will be recorded per 100 ft. segment of the creek. The information will include sediment thickness, texture, color, aerial extent and differences from native soil. Discrete sediment samples will be collected from the unnamed creek during the performance of the sediment survey where it is determined to be necessary to separate the sediments from the native soil. During this survey, if standing water or water flow is encountered in the unnamed creek, a sufficient number of surface water samples will be collected to determine the impact of the sediments on surface water and also to compare the surface water quality with groundwater quality. The sediment samples from the unnamed creek will be analyzed for Lead, Cadmium, Arsenic, Mercury, Chromium and Zinc.

Sediment Sample Collection in Drum Creek

Discrete sediment samples will be collected from Drum Creek at the locations shown on Figure 1. The sediment samples obtained from Drum Creek will be analyzed for Lead, Cadmium, Arsenic, Mercury, Chromium and Zinc. The following describes the protocol which will be followed during sediment sample collection.

Sample Depth

The discrete sediment samples from Drum Creek will be taken from the top 6 inches of the accumulated sediments.

Sampling Tools

1. Sediment sampling device may be any of the following:
   a. Tube-type soil sampler(s) fitted with a 6-inch to 12-inch sampling tube
   b. Stainless steel or plastic spoon or trowel
   c. Sharpshooter type shovel
2. Nitrile or vinyl gloves to be worn by samplers during any activities which involve contact with the sediment samples.
3. Pre-cleaned wide-mouth 500ml glass containers with Teflon lined lids for composite sample retention.

4. Distilled or de-ionized water for decontamination of equipment.
5. Alconox soap for decontamination of equipment.

Personal Protective Equipment

Field personnel will be equipped with the following personal protective equipment:

5. Hard hat
6. Safety glasses
7. Rubber boots
8. Nitrile or Vinyl gloves

Nitrile or Vinyl gloves and disposable sampling tools will be placed in a plastic trash bag for disposal after use. At the conclusion of sampling, liquid wastes (Alconox solution, rinse water) will be transported to the site for disposal.

Sampling Protocol

Sampling of sediments along the unnamed drainage channel and Drum Creek will be conducted using the following protocol:

1. Sampling staff will don clean Nitrile gloves. Thoroughly clean the soil sampler (particularly the sampling tube) with Alconox/distilled or de-ionized water mixture and rinse with distilled or de-ionized water.
2. Beginning at the background sampling locations within Drum Creek samplers will establish grab sample locations by measuring along the channel or Drum Creek with either a tape measure or measuring wheel.
3. At each sample location, the sediments will be penetrated approximately 6-inches deep with the tube type soil sampler or other appropriate pre-cleaned tool and two (2) samples about 500 ml in volume each removed. The 500 ml samples will be placed in separate labeled glass 500-ml capacity jars and placed in coolers for shipment to the laboratory and one set of split samples will be maintained in the samplers custody.

   A soil sampling log will be maintained by the sampling team for future reference (Figure 2) and entries will be made in the Field Notebook.
4. Sampling team members will then clean the soil sampler(s) and other tools with Alconox and distilled or de-ionized water followed by a thorough rinse with distilled or de-ionized water. Sampling team members will don clean Nitrile gloves prior to continuing with sampling.
5. The above sampling sequence will be followed for each of the remaining sediment samples.
6. At conclusion of sampling, conduct final decontamination of sampling equipment and reusable personal protective equipment.

Decontamination Procedures

Decontamination procedures will consist of the following:

1. Sampling team members will don clean Nitrile gloves prior to initiating sampling and after each discrete sample has been obtained.
2. The soil sampling tool or other appropriate sampling tool will be cleaned with a brush and a solution of Alconox prior to beginning sampling and after each composite sample has been obtained. Particular attention will be paid to any portion of the sampling tool with cracks, crevices or an irregular surface which might trap contaminated material. The sampling tool will then be rinsed with distilled or de-ionized water and, if necessary, dried with a clean paper towel.

3. After sampling is complete, reusable personal protective equipment (i.e. boots) will be washed with an Alconox soap solution and scrub brush, followed by thorough rinsing with distilled or de-ionized water.

Preservation Procedures

Since the only constituents of concern associated with this sampling effort are metals, no preservatives are required. The samples will be placed in the glass 500-ml sample jars in coolers while in transit to the laboratory. One set of split samples will be retained by the sampling team for additional analyses should it be deemed necessary or desirable at a later date.

Labeling; Chain of Custody

A label with the following information will be affixed to each sample jar:

- Name of Sampling Firm
- Initials of Sampler
- Client/Source
- Site Name
- Sample Identification
- Identified as Grab (Discrete) or Composite
- Date of Sample Collection
- Time of Sample Collection
- Preservatives (if used)
- Analyses requested to be performed by Laboratory

The chain of custody form (Figure 3) will be completed and submitted with the samples and procedures outlined in EPA SW-846 followed throughout delivery of samples to the analytical laboratory.

Water Sample Collection

Introduction

Surface water samples will be collected from the unnamed creek and Drum Creek. Locations of any water samples collected will be noted in the field notebook and on the sample location map. As discrete sediment samples are collected along Drum Creek, a discrete water sample will be collected from each sediment sample location.

Sampling Tools

1. Disposable Polyethylene bailer, dipper or bottle
2. Nitrile or vinyl gloves to be worn by samplers during any activities which involve contact with the soil samples.
3. Pre-cleaned wide-mouth 500ml plastic containers with nitric acid preservative and plastic lids for sample retention.
4. Distilled or de-ionized water for decontamination of equipment.
5. Alconox soap for decontamination of equipment.

Personal Protective Equipment

Field personnel will be equipped with the following personal protective equipment:

1. Hard hat
2. Safety glasses
3. Rubber boots
4. Nitrile or Vinyl gloves

Nitrile or Vinyl gloves and disposable sampling tools will be placed in a plastic trash bag for disposal after use. At the conclusion of sampling, liquid wastes (Alconox solution, rinse water) will be transported to the site for disposal.

Sampling Protocol

Sampling of water will be conducted using the following protocol:

1. Sampling staff will don clean Nitrile gloves.
2. Using a disposable bailer, immerse the bailer in the standing water to be sampled and withdraw the collected sample.
3. The sampler(s) will discharge the collected sample into the proper containers for transport to the analytical laboratory. Two (2) containers will be required for each water sample collected. One container will contain preservative (nitric acid) while the second container has no preservative. Both containers will be properly labeled and placed in a prechilled cooler at 4° C for storage and transport.

   A sampling log will be maintained by the sampling team for future reference (Figure 2) and entries will be made in the Field Notebook.

4. Sampling team members will then don clean Nitrile gloves prior to continuing with sampling.
5. The above sampling sequence will be followed for each water sample collected.
6. At conclusion of sampling, conduct final decontamination of sampling equipment and reusable personal protective equipment.

Decontamination Procedures

Decontamination procedures will consist of the following:

1. Sampling team members will don clean Nitrile gloves prior to initiating sampling and after each composite sample has been obtained.
2. The reusable sampling equipment will be cleaned with a brush and a solution of Alconox prior to beginning sampling and after each sample has been obtained.
3. After sampling is complete, reusable personal protective equipment (i.e. boots) will be washed with an Alconox soap solution and scrub brush, followed by thorough rinsing with de-ionized water.

Number of Samples

The total number of water samples obtained during the field sampling program will be determined by the amount of water encountered in the unnamed drainage channel and Drum Creek.

Preservation Procedures

Since the only constituents of concern associated with this sampling effort are metals, nitric acid preservative is required. The samples for metals analysis will be placed in the prepreserved plastic 500-ml sample jars and maintained at 4°C in coolers while in transit to the laboratory.

Labeling; Chain of Custody

A label with the following information will be affixed to each sample container:

- Name of Sampling Firm
- Initials of Sampler
- Client/Source
- Site Name
- Sample Identification
- Identified as Grab or Composite
- Date of Sample Collection
- Time of Sample Compositing
- Preservatives (if used)
- Analyses requested to be performed by Laboratory

The chain of custody form (Figure 3) will be completed and submitted with the samples and procedures outlined in EPA SW-846 followed throughout delivery of samples to the analytical laboratory.

Field Notebooks

Each field and sampling activity at the site will be documented to ensure proper identification and tracking of samples. Field notebooks will be used to document the activities performed at the site. Entries will be written with as much detail as possible. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, the signature of the person making the entry will be noted. The items that will be recorded daily in the field notebooks include the following:

- The methodology used for identifying sampling locations and depth, and the corresponding sample designations.
- Detailed information on all samples collected and results of field descriptions.
- Descriptions of sampling equipment used, including decontamination procedures.

All entries will be made in ink or pencil, and no erasures will be permitted. If an incorrect entry is made, the information will be crossed out with a single strike mark. Any such corrections, strikeouts, and/or additions made in the field notebook will be clearly identified as such, and initialed by the person making such corrections and the date of the corrections noted next to the initials.

Analytical Parameters

Soil and Sediment Samples

Parameters, methods and detection limits for soil and sediment samples analyses may include the following:

	Parameter	Analytical Method	Detection Limit Soil
1.	Total Lead	Method SW846-6010	0.5 mg/kg
2.	Total Cadmium	Method SW846-6010	0.5 mg/kg
3.	Total Arsenic	Method SW846-6010	0.5 mg/kg
4.	Total Chromium	Method SW846-6010	0.5 mg/kg
5.	Total Zinc	Method SW846-6010	0.5 mg/kg
6.	Total Mercury	Method SW846-7470/7471	0.2 mg/kg
7.	pH	Method SW846-9045	-- SU

Water Samples

Parameters, methods and detection limits for water samples analyses may include the following:

	Parameter	Analytical Method	Detection Limit Water
1.	Total Lead	Method SW846-6010	0.005 mg/L
2.	Total Cadmium	Method SW846-6010	0.005 mg/L
3.	Total Arsenic	Method SW846-6010	0.005 mg/L
4.	Total Chromium	Method SW846-6010	0.005 mg/L
5.	Total Zinc	Method SW846-6010	0.005 mg/L
6.	Total Mercury	Method SW846-7470/7471	0.0002 mg/L
7.	Specific Conductance	EPA 120.1	
8.	Total Hardness ($CaCO_3$)	EPA 130.2	
9.	Total Suspended Solids	EPA 160.2	
10.	Field Temperature		
11.	Field pH	Method SW846-9045/EPA 150.1	-- SU

Analytical Laboratories

The following laboratory will be used for sample analysis:

1. Sherry Laboratory of Oklahoma, Tulsa, Oklahoma (certified in the State of Kansas)
2. If deemed necessary or desirable, additional laboratories will be selected at a later date. In such case, KDHE will be contacted and all necessary information related to the laboratory will be submitted for KDHE review and approval. After KDHE approval, that particular laboratory will be contracted.

Quality Control and Quality Assurance (QC/QA)

Field QC/QA

Prior to conducting any field testing, the instrument to be used will have the calibration checked against the appropriate standards, and if required, recalibrated according to the manufacturer's recommendations. Calibration logs will be maintained on the project site for each instrument which may be used for field analysis.

Field samples collected will be a soil matrix, thus disallowing the use of a "Trip Blank" or "Field Blank. For soil samples collected in the field, and transported to a contract laboratory for analysis, quality control will be limited to sample duplicates. Duplicate samples will be collected at a rate of one duplicate sample per each twenty field samples collected. To prevent bias on the part of the laboratory when analyzing samples, the duplicates will be labeled with the same identification information as other samples, and no distinction noted that the sample is a QC duplicate. A record will be made in the field notebook and on the soil sampling log, which will provide field personnel relevant information about the correlating sample number.

When reusable sampling equipment is used to collect field samples, equipment rinsate blanks will be collected at a rate of one per twenty investigation samples per sample medium or one per day per sample medium, whichever is less, to demonstrate that decontamination procedures are effective in preventing cross-contamination.

Laboratory QC/QA

The analytical laboratory will be analyzing matrix spikes, matrix spike duplicates, surrogate spikes and surrogate spike duplicates as part of its quality control procedures. To ensure the integrity and validity of data generated during the analysis of samples, the analytical laboratory will follow it's standard Quality Control/Quality Assurance (QC/QA) Program throughout its involvement in this project.

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SECTION 1.0 INTRODUCTION

The Quality Assurance Project Plan (QAPP) presented herein is structured to implement the procedures necessary to achieve and maintain a consistently high level of quality in environmental site investigation activities performed at the National Zinc Company Site, Cherryvale, Kansas. This consistency will be accomplished through the standardization and thorough documentation of field techniques and activities. This QAPP is presented in a format that provides the structure for achieving a high level of confidence in the quality of work performed.

Definable Features of Work

This QAPP is generated to address the Cherryvale site investigation activities specified in the Sediment and Water Sampling and Analysis Plan.

Analytical Sampling

The objective of field sampling and laboratory analytical procedures is to obtain defensible data using the data quality objective (DQO) process for data collection. Data quality requirements for precision, accuracy, representativeness, comparability and completeness are defined for a site and must be achieved in order to satisfy DQOs.

A major required component of all field investigation sampling plans is maintaining sample integrity from collection to data reporting. To maintain and document sample possession, chain-of-custody procedures must be implemented. Elements of the chain include, at a minimum:

- Sample seals
- Labels with identification numbers to allow for sample tracking
- Field log books
- Field data record forms

- Chain-of-custody records
- Sample analysis request sheets
- Bills of lading and air bills
- Field and laboratory tracking forms.

Field and laboratory sample custodians or their designated representatives are responsible for maintaining custody of samples. A sample is considered to be under a person's custody if one or more of the following conditions are met:

- It is in the person's physical possession.
- It is in view of the person.
- It is secured by the person so that no one can tamper with the sample without being detected.
- It is secured by the person in an area that is restricted to authorized personnel.

Chain-of-custody will be maintained in the field through use of field log books, chain-of-custody records, sample labels, custody seals and airbills/bills of lading. Once the samples have arrived in the laboratory, the chain-of-custody is continued through use of an internal sample tracking system and locked or limited access sample storage areas. All records which are generated through the field and laboratory efforts are part of the Quality Assurance records kept in the project file. Each of the three steps which comprise the chain-of-custody process are described below.

Field Sample Custody

The sample custody program includes procedures for the preservation of samples, sample identification, recording sample collection locations and specific considerations associated with sample acquisition. The chain-of-custody requires, at a minimum, the following:

- Appropriate project identification information,

- Sample identification,
- Sample location,
- Sample date and time,
- Sample matrix,
- Number of containers per sample,
- Analysis required,
- Sampler's name,
- Release and acceptance information: i.e., date, location and technician's signature.

In-situ or field measurements (e.g. pH measurements, temperature, conductivity, flow measurements, compaction and air monitoring data) are recorded in field log books or on field data record forms. Sample containers are labeled or tagged appropriately according to applicable implementing procedures and plans. Labels or tags contain the following information:

- Organization and site name,
- Location of sample collection,
- Date and time of sample collection,
- Preservation,
- Sample identification number,
- Name(s) of sampler(s).

Custody seals will be affixed to all shipping containers. Samples are accompanied by chain-of-custody records. Completed chain-of-custody documents are retained as quality assurance records and maintained in accordance with the Quality Assurance Program.

Laboratory Sample Custody

Samples are packaged and delivered personally or shipped to the laboratory in accordance with U.S. Department of Transportation requirements with a separate custody record accompanying each shipment. Authorized sample custodians at the laboratories sign for incoming field

samples, obtain documents of shipment and verify data entered onto the sample custody records. The laboratories are required to inform A & M Engineering and Environmental Services, Inc. (A & M Engineering) of receipt of samples within one working day. If any damage or shipping discrepancy is noted upon receipt of samples, the laboratories are required to inform A & M Engineering. The Project Quality Control Manager and Project Manager will be notified. The samples are then entered into an internal tracking system and placed in locked or limited access storage in order to maintain internal chain-of-custody. Contract laboratories are required to maintain custody of samples to assure sample integrity.

Quality Assurance Records

Records generated as a result of analytical sampling activities are Quality Assurance Records and will be processed in accordance with the requirements of this QAP Plan. Documents such as Chain-of-Custody Records, analytical testing results and other required laboratory deliverables are essential documents necessary to ensure the integrity and defensibility of data used to make decisions in the remediation process. Further, Quality Assurance Records provide the record of events that have occurred for all features of the remedial work and their adequate generation, review, protection and submittal is essential to the success of the project.

Data Quality Objective

The objective is to establish the precision, accuracy, representativeness, completeness and comparability requirements of environmental sampling, analysis and measurement data. The parameters to be analyzed and associated detection limits are outlined in the Sediment and Water Sampling and Analysis Plan (Sampling and Analysis Plan). The Sampling and Analysis Plan also provides requirements for field sampling and testing. Samples will be collected in the field according to the Sampling and Analysis Plan which provides the details for decontamination of sampling equipment, sample packaging and preservation, transportation, sample numbering, chain-of-custody and documentation requirements. Samples will be collected in the field and sent to laboratories certified to perform the required analyses. Spiked and duplicate samples will

be used to develop estimates of the accuracy and precision of the analytical data. Field surveillance of sampling, field measurements and chain-of-custody procedures will be used to verify that proper techniques are being followed.

Preconstruction-Remediation Quality Control Meetings

To ensure that all parties performing work at the National Zinc Company Site, Cherryvale, Kansas fully understand the Quality requirements established for this project, a Pre-Investigation Meeting will be held prior to the start of site investigation activities. Attendees at the meeting include the Contracting Officer, or designee; the A & M Engineering Project Manager; the A & M Engineering Project Quality Control Manager; the A & M Engineering Project Superintendent; and KDHE personnel. Minutes of the meeting shall be prepared by the A & M Engineering Project Superintendent and signed by all meeting attendees. A copy of the minutes of the meeting will then be provided to the contracting officer and KDHE personnel.

SECTION 2.0 QUALITY CONTROL PERSONNEL

Quality Control Manager (QCM)

All project activities will be monitored by QCM to ensure that they are consistent with the procedures described in the Work Plan and are capable of providing data of sufficient quality to achieve the project objectives. QCM is responsible for the following activities:

- Implement Quality Assurance Project Plan (QAPP).
- Maintain communication with Project Manager and Sampling Personnel to ensure that all field activities are performed in accordance with the Sampling and Analysis Plan and achieve the Quality Standards required.
- Conduct field audits during sampling activities to determine if proper procedures are being followed.
- Review field and analytical data for completeness and accuracy.
- Report on a regular and timely basis inspection/test results.
- Maintain a Quality Assurance file of all data and other project records.

Laboratory QA/QC Officer

Sherry Laboratory of Oklahoma will analyze samples and laboratory QA/QC will be the responsibility of the laboratory QA/QC Officer. Also, the Laboratory Manager is responsible for QA/QC requirements. A Quality Assurance Manual for Sherry Laboratory of Oklahoma is included in the Sampling and Analysis Plan as an appendix.

The QA/QC Officer will report to the Quality Control Manager.

SECTION 3.0 REQUIRED QC DOCUMENTATION

This section of the Quality Assurance Project Plan delineates the required Quality Control documentation that is to be completed to support the National Zinc Company Project. Table 3-1 provides a listing of required checklists to be completed when performing inspections and specific forms to be used for activities such as sample chain-of-custody. Samples of these forms are included as attachments to this section.

TABLE 3-1:*Required Documentation*

Document Name	Document Number	Completed By
Contractor Daily Report		A & M Site Supervisor
Soil Sampling Log		Quality Control/Sampling Technician
Chain-of-Custody Form		Quality Control/Sampling Technician

SECTION 4.0 LABORATORY QUALIFICATION PACKAGE

Laboratory services will be conducted by Sherry Laboratories of Oklahoma.

For analytical sample testing, the selected laboratory must meet, as a minimum, U.S. EPA and State of Kansas DHE requirements. The laboratory will be required to submit their laboratory QAPP to A & M Engineering. Additionally, the selected analytical laboratory will be required to submit deliverables to support the data validation process. The laboratory will have Quality Control measures meeting the criteria stated in Tables of Internal (Laboratory) QC Samples, Quality Assurance Goals - Precision, Quality Assurance Goals - Accuracy, Percent Recovery, and Calibration Procedures. These tables are included at the end of this section.

SECTION 5.0 IDENTIFICATION AND CONTROL OF SAMPLES

This procedure describes standard procedures for sampling during the site remediation activities, including decontamination, packaging, transport and sample custody. Sample documentation is described and examples of types of documentation forms are provided.

Responsibilities

Quality Control Manager (QCM)

The QCM is responsible for performance of preparatory, initial and follow-up inspections of analytical sampling activities to ensure compliance with the requirements of this procedure and the Quality Assurance Project Plan. Additionally, the QCM is responsible for maintaining the status of sampling activities on the Remediation Plan provided in the Quality Assurance Project Plan.

Sample Technician

The Sample Technician is responsible for the physical collection of samples in accordance with the requirements of this procedure, and for ensuring proper chain-of-custody of collected samples.

Definitions

Sampling Event

A sampling event is considered to be from the time the sampling personnel arrive at the site until the personnel leave for more than a day. An example of two sampling events would occur if sampling personnel went to a site for three weeks, collected surface samples, drilled borings and put groundwater wells in place. During this visit, soil and water samples were collected. The sampling crew then left the site for two months, thus concluding the first sampling event. The

crew later returned to collect another set of samples over a three-day period. The second visit would constitute the second sampling event.

Trip Blank

Trip Blanks are QC samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic (VOA) samples. One trip blank should accompany each cooler containing VOAs, should be stored at the laboratory with the samples and analyzed by the laboratory. Trip blanks are only analyzed for VOAs. No VOAs are planned for this project.

Equipment Rinsate

Equipment rinsate is a type of QC sample and are the final analyte-free water rinse collected after equipment decontamination and during a sampling event. Equipment rinsate will be taken once each sampling event. If analytes pertinent to the project are found in the rinsate, the field decontamination procedure will be evaluated and improved. The rinsate is analyzed for the same parameters as the related samples.

Field Blanks

Field blanks are a type of QC sample that consists of the source water used in decontamination. At a minimum, one field blank from each event and each source of water must be collected and analyzed for the same parameters as the related samples.

Field Duplicates/Splits

Field Duplicates (or splits) for soil samples will be collected in the field and prepared by homogenizing the soil sample and splitting into two samples. All samples except those designated for VOA analysis will be homogenized and split. For VOA analysis, select segments of soil will be taken from the length of the core and placed into 40 ml glass vials. Cores may be sealed and shipped to the laboratory for subsampling if the project deems this appropriate. The

field duplicates for water samples should be collected simultaneously. Field duplicates should be collected at a frequency of 5% per sample matrix. All the duplicates should be sent to the primary laboratory responsible for analysis. The same samples used for field duplicates shall be split by the laboratory and be used as the laboratory duplicate or matrix spike and a matrix spike duplicated (MS/MSD). This means that for the duplicate sample, there will be analyses of the normal sample, the field duplicate and the laboratory MS/MSD. A separate MS/MSD will not be collected in the field, but will be obtained from the field duplicate by splitting the sample in the laboratory.

Sampling Requirements

Decontamination

Equipment that may come in contact with potentially contaminated soil, sediment, waste, or water will be decontaminated prior to and after use. Decontamination consists of phosphate-free detergent wash, and distilled, deionized (DI), or clean water rinse, as appropriate.

Sampling equipment will be decontaminated utilizing EPA guidelines. Summary decontamination steps are as follows:

Water Sampling Equipment

Prior to collecting a water sample, non-dedicated sampling equipment must be decontaminated according to the following procedure.

1. *Equipment.* Remove all visible contamination with clean tap water and an Alconox™ solution. If this is not effective, use a clean soft cloth or sponge or use pressurized water to clean equipment. If required, a brush may be used to clean stainless steel or metal equipment but not plastic equipment, which may be scratched by the brush. After cleaning equipment with tap water, triple rinse equipment with distilled or de-ionized water.

2. *Hoses*. Clean outside of hoses with high pressure hot water. Pump 3 volumes of clean tap water through hoses. If possible, use pressurized tap water. After cleaning hoses with tap water, pump 3 volumes of distilled or de-ionized water through hoses.
3. *Probe tips and meters*. Triple rinse with distilled or de-ionized water.
4. Collect sample according to the specific procedure for the sample type.
5. Rinse all sample collection equipment with clean tap water followed by distilled or de-ionized water. Store equipment in clean containers.

Soil and Sediment Sampling Equipment

Equipment used to collect samples for chemical analysis requires thorough decontamination, as described below:

1. Wash equipment (augers, split spoons, utensils, etc.) with distilled or de-ionized water, an Alconox™ solution, and/or a high-pressure washer. **If visible contamination remains, steam clean the equipment.**
2. A solvent rinse (Isopropanol) may be required to remove organic contamination that is not removed by washing and/or steam cleaning.
3. Rinse with clean tap water.
4. Triple rinse all equipment with distilled or de-ionized water and allow to air dry.
5. Collect sample according to the specific procedure for the sample type.
6. Rinse all sample collection equipment with clean tap water followed by distilled or de-ionized water. Store equipment in clean containers.

<u>QA Sample Codes:</u>

F - Field Blank

E - Equipment Rinsate

T - Trip Blank

The sample code will be followed by a four-digit date where the first two digits indicate

the month and the second two digits indicate the day, (ex: August 14 would be written as 0814). As an example, XXX-W06-F1025 is the sample identifier for the field blank collected at SWMU 6 on October 25.

Sample Packaging and Transport

Each sample will be packaged and transported appropriately as described in the following protocol:

- Collect samples in appropriate containers and add preservatives, as needed (Table 1).
- Print the following information clearly in waterproof ink on the label for each sample container: the preservative that has been added to each sample container, the sample number, the project number, the initials of the sample collector, and the date and time the sample was collected. For water samples, package sets together if appropriate.
- Fill out field sample log and chain-of-custody record.
- Separate and place samples in coolers according to laboratory destination and according to expected concentrations (e.g., lowest concentration samples together). Each cooler must weigh less than 70 pounds including ice. Package samples well to protect from shipping damage.
- Place samples on ice, as necessary (Table 1).
- Seal the top two copies of each chain-of-custody form inside a ziplock bag. Use strapping tape to attach the packet to the inside of the cooler lid. Samples will always be accompanied by a chain-of-custody record. When transferring samples, both the individuals relinquishing and receiving the samples will sign and date the chain-of-custody record. Samples will be packaged properly for shipment, including isolation of samples thought to have high chemical concentrations and dispatched to the appropriate laboratory for analysis.
- Secure cooler with custody seal.

- Label coolers correctly, placing "Fragile" and "This-End-Up" labels on coolers, as appropriate.
- Transport the coolers to the designated analytical laboratories via A & M Engineering Team personnel or designated couriers. Alternatively, commercial couriers, A & M Engineering Team couriers, or overnight shipment may be used. Specific transportation arrangements are dependent on the location of the Delivery Order Site and the analytical laboratories; specific procedures will be described in site-specific planning documents.

Sample Custody

Sample custody procedures will be followed through sample collections, transfer, analysis and ultimate disposal. The purpose of these procedures is to assure that the integrity of samples is maintained during their collection, transportation and storage prior to analysis and sample material is properly disposed after analysis. Sample custody begins with the shipment of the empty sample containers. Sample containers are shipped from the laboratory in sealed coolers or cartons with appropriate seals and custody documentation. Sample quantities, types and locations will be determined before the actual field work commences. The Sample Technician will be responsible for the care and custody of the samples until properly transferred. Custody transfer will be documented on the Chain-of-Custody Form.

At the analytical laboratory, a designated sample custodian will accept custody of the shipped samples and verify that the information on the sample label matches that on the chain-of-custody form(s). Pertinent information as to sample condition, shipment, pickup, and courier will also be checked on the chain-of-custody form(s). In addition, a project receipt checklist (e.g. Cooler Receipt Form) will also be completed by the custodian. Information on the date and time of receipt, method of shipment, and sample

condition will be recorded on this form. The custodian will then enter the appropriate data into the laboratory sample tracking system. The laboratory custodian will use the sample number on the sample label as well as assign a unique laboratory number to each sample. The custodian will then transfer the sample(s) to the proper analyst(s) or store the sample(s) in the appropriate secure area.

Laboratory personnel will be responsible for the care and custody of samples from the time they are received and are responsible for sample disposal. Data sheets and laboratory records will be retained as part of the permanent documentation for a period of at least 3 years.

Samples and extracts are retained by the analytical laboratory for up to 30 days after the data are reported by the laboratory. Unless notified otherwise by the site managers, excess or unused samples are disposed by the laboratory in a manner consistent with appropriate government regulations.

Sample Documentation

Each sample will be labeled and sealed properly immediately after collection. Sample identification documents will be carefully prepared so that identification and chain-of-custody records can be maintained and sample disposition can be controlled. Forms will be filled out with waterproof ink. The following identification documents will be used during the investigation.

- Sample Labels
- Field Logs
- Chain-of-Custody Forms

Sample Labels

Sample labels are necessary to prevent misidentification of samples. Where necessary,

the label will be protected from water and solvents with clear label-protection tape. Each label contains the following information:

- Project name,
- Project number,
- Name of collector,
- Date and time of collection,
- Place of collection (job site),
- Sample number,
- Well/boring number,
- Depth,
- Preservative, if any.

Field logs

A Field Log will be used daily by the Sample Technician to record activities as they relate to the progress of the investigation. The field logs will be retained in the investigation files according to project number for that task. Entries in the field log will include at least the following information:

- Project name,
- Project number,
- Name of author and date,
- Chronology and location of activities,
- Names and affiliations of personnel onsite,
- Instrument calibration details and identification number,
- Decontamination procedures,
- Sample collection or measurement methods,
- Number of samples collected,
- Sample identification numbers,
- Sample distribution (laboratory),

- Field observations and comments,
- Any modifications to or deviation from the site specific Sampling and Analysis Plan.

Chain-of-Custody Record

A chain-of-custody record will be filled out for and will accompany every sample to the analytical laboratory to establish the documentation necessary to track sample possession from the time of collection. A copy of the chain-of-custody form will be retained in the investigation files according to project number. The record will contain the following information:

- Sample number or identification,
- Names of samplers,
- Signature of collector, sampler or recorder,
- Location of project,
- Project manager's name,
- Date of collection,
- Place of collection (site location),
- Sample type,
- Analyses requested,
- Inclusive dates of possession
- Signature of person relinquishing or receiving sample,
- Laboratory sample number, where applicable,
- Date and time of sample receipt,
- Method of shipment and courier name.

Corrections to Sample Documentation

Original data recorded in field investigation daily reports, chain-of-custody records, and

other forms will be written in waterproof ink. None of these documents will be altered, destroyed or discarded, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document compiled by one individual, that individual will make the necessary correction by crossing a single line through the error, entering the correct information and initialing and dating the change. The erroneous information will not be obliterated. Any subsequent error(s) discovered on a document will be corrected by the person discovering the error. All corrections will be initialed and dated. Site-specific documentation will be reviewed by site managers on a daily basis.

REFERENCED FORMS

Chain-of-Custody Form,

Tables on Sample Preservation and Storage Requirements.

APPENDIX C

Site Specific Health and Safety Plan

SITE SPECIFIC HEALTH & SAFETY PLAN ADDENDUM
(FIELD SAMPLING ACTIVITIES)

FOR

National Zinc Site
Cherryvale, Montgomery County, Kansas

March 28, 2002

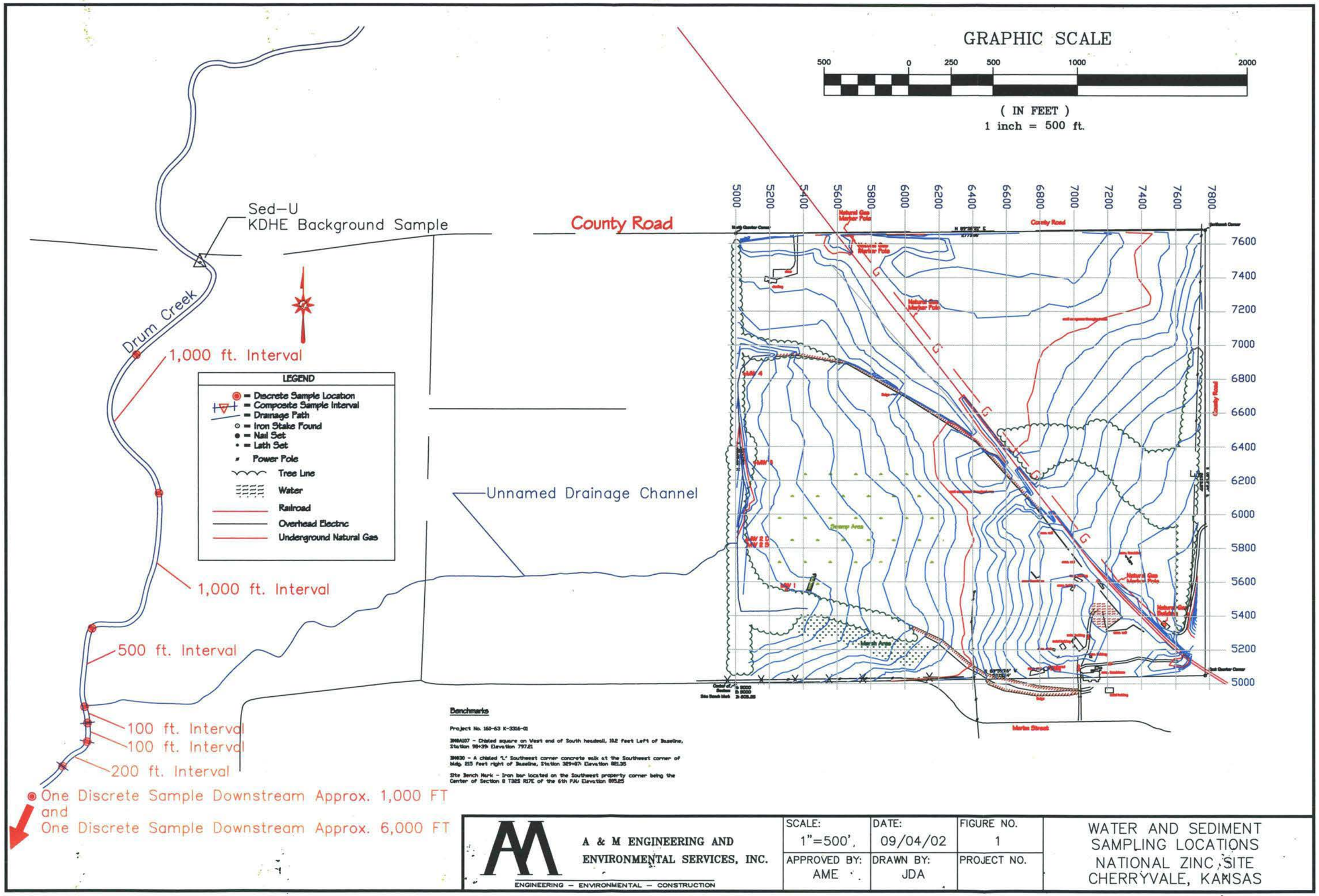
Project Summary:

A & M Engineering and Environmental Services, Inc. (A & M Engineering) has been contracted by Salomon Smith Barney Holdings, Inc. and the United Steel Corporation to conduct soil, sediment and water sampling activities as part of the overall characterization to be conducted at the National Zinc Site located in Cherryvale, Montgomery County, Kansas. Samples of sediment and water will be collected primarily from the unnamed drainage channel, Drum Creek, and background locations. Figure 1 (Water and Sediment Sampling Locations) shows the sample locations.

The primary contaminants of concern are lead, cadmium, zinc, chromium, and silver; all of which have been detected on-site at elevated levels as a result of the former smelter facility. These heavy metal contaminants are present on-site in concentrations that could potentially pose a health hazard from dermal contact/ingestion and/or associated dust inhalation. Therefore, all workers on-site will be 40-hour HAZWOPER trained.

Corporate Health & Safety Plan:

A & M Engineering has a Corporate Health & Safety Plan (CHSP) in place that addresses all aspects of health and safety encountered on typical project sites. However, specific project needs are addressed in the following addendum. A copy of the CHSP is available for Kansas Department of Health & Environment (KDHE) and client representatives upon request. A copy of this addendum and the CHSP will be kept on-site at all times during field sampling activities.


GRAPHIC SCALE
500 0 250 500 1000 2000
(IN FEET)
1 inch = 500 ft.
Sed–U
KDHE Background Sample
County Road
Drum Creek
1,000 ft. Interval
LEGEND
Discrete Sample Location
Composite Sample Interval
Drainage Path
Iron Stake Found
Nail Set
Lath Set
Power Pole
Tree Line
Water
Railroad
Overhead Electric
Underground Natural Gas
Unnamed Drainage Channel
1,000 ft. Interval
500 ft. Interval
100 ft. Interval
100 ft. Interval
200 ft. Interval
One Discrete Sample Downstream Approx. 1,000 FT
and
One Discrete Sample Downstream Approx. 6,000 FT
Benchmarks
Project No. 160-63 K-3316-01
Swamp Area
Marsh Area
Martin Street
A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
ENGINEERING – ENVIRONMENTAL – CONSTRUCTION
SCALE: 1"=500'
DATE: 09/04/02
FIGURE NO. 1
APPROVED BY: AME
DRAWN BY: JDA
PROJECT NO.
WATER AND SEDIMENT SAMPLING LOCATIONS
NATIONAL ZINC SITE
CHERRYVALE, KANSAS

Emergency Contingency:

Prior to commencement of construction activities an assembly point will be designated for emergency situations. At least one (1) cellular phone will be available on-site during all field sampling activities. The closest emergency response entities are shown below:

Mercy Hospital (11.3 miles southwest) – **DIRECTIONS SEE ATTACHMENT 1 (MAP)**
800 West Myrtle Street
Independence, Kansas 67301
(620) 331-2200

Cherryvale **Fire Department** - **DIRECTIONS SEE ATTACHMENT 1 (MAP)**
116 South Neosha Street
Cherryvale, Kansas
(620) 336-2121

Cherryvale **Police Department (620) 336-2400**

Montgomery County Local Emergency Planning Commission (L.E.P.C)
County Judicial Court Basement
300 East Main Street
Independence, Kansas 67301-3762
(620) 252-4614

ALL EMERGENCIES 911

Pre-Construction Activities:

Prior to commencement of field sampling activities a Preliminary Site Entry Evaluation Form (Attachment 2) will be completed by either the Site Project Manager (SPM) or Site Construction Supervisor (SCS) with the assistance of the Corporate Health & Safety Officer (CHSO) or his designee as deemed necessary by Corporate Management (CM).

Relative to the information compiled on the Preliminary Site Entry Evaluation Form and in reference to the health and safety requirements included herein a Pre-Construction Health & Safety Meeting will be conducted for all A & M Engineering personnel and subcontractors to be involved in the on-site field sampling activities. The meeting will be conducted by either of the following individuals:

Site Project Manager (SPM)	Altay Ertugrul
Site Construction Supervisor (SCS)	David Anderson
Corporate Health & Safety Officer (CHSE)	Jeff Elbert

Assistant Health & Safety Officer (AHSO)	Joe Kennedy
Site Health & Safety Officer (SHSO)	Jon Kuhn

Attendees will be required to sign the Pre-Job Safety Orientation Signature Sheet included as Attachment 3.

Facility Access/Egress:

Workers will enter and exit the facility at designated locations. All workers are restricted to the areas where they are performing work and wandering will not be permitted. The general on-site roadway speed limit is 15 MPH unless otherwise posted.
All vehicles will travel on designated roads. Roadways will not be blocked without prior approval. Vehicles and equipment will not be left running unattended.

No weapons, firearms, or explosives will be allowed on any worker or within any vehicle/equipment entering the site.

Specific Environmental Standards:

Provisions will be made to ensure that all work is done in compliance with all environmental laws, rules, and regulations in a way that minimizes potential releases to the environment.

Hygiene & Personnel Protective Equipment:

All workers required to work within areas that may require the use of respirators will be clean shaven, except for mustaches which do not exceed the corners of the upper lip and sideburns which do not extend below the earlobes. Bottled drinking water and toilet facilities will be provided, as appropriate in designated areas. Smoking and other tobacco use will be limited to restricted areas.

Personal Protective Equipment (PPE) will be provided to all workers (at no cost) and include the following at a minimum:

Hard Hat (ANSI Z89.1 approved)
Safety Glasses (ANSI Z87.1 approved)
Steel Toed Rubber Boots with minimum six inch uppers
Nitrile or vinyl gloves

Appropriate long sleeved clothing and long pants (or tyvek suit) must be worn at all times. Significant dust quantities are not anticipated therefore, tyvek suits will not be required initially. Personnel will simply be instructed to wash their work clothes daily and wash their hands and face repeatedly with soap and water prior to smoking and/or eating. In the event elevated fugitive dust becomes a concern then tyvek suites may become mandatory. In addition dust masks and/or half-faced air-purifying respirators may be necessary if fugitive dust becomes a concern.

Medical Surveillance:

The primary contaminants of concern are lead, cadmium, zinc, chromium, and silver; all of which have been detected on-site at elevated levels as a result of the former smelter facility. These heavy metal contaminants are present on-site in concentrations that could potentially pose a health hazard from dermal contact/ingestion and/or associated dust inhalation. Therefore, all workers on-site will be 40-hour HAZWOPER trained. However, due to the relatively short duration (1-2 days) required on-site for the field sampling no medical surveillance will be conducted.

General Safety Requirements:

The buddy system will be mandatory for all field sampling activities. Therefore, under no circumstances will less than two (2) employees be present on-site at any given time for field sampling. All sediment and water sampling of the creek and drainage channel will be conducted from the shoreline. Employees will not be allowed to enter the creek or drainage channel waters without the additional precautions and PPE, which may be needed.

Employees will be directed to prevent direct contact with any of the sampling media. In addition, special precautions will be taken to prevent spillage and direct employee contact with sample bottle preservatives (acid). In the event an employee comes into direct contact with the media being sampled or sample bottle preservatives they will be instructed to wash thoroughly with soap and water.

Decontamination:

Decontamination of sampling equipment and workers will be conducted as needed, using standard practices to prevent direct employee contact with on-site soils, sludge, sediment, and water.

Air Monitoring:

Due to the relatively short duration (1-2 days) required on-site for field sampling activities and lack of anticipated fugitive dust no air monitoring will be conducted.

Injury To Employees & Incident Investigation:

All injuries will be reported immediately to the proper client representatives. An Occupational Injury and Illness Report will be completed and supplied to the designated representative within one working day of the incident, no matter how minor. Incident investigations will be conducted in accordance with A & M Engineering and client policies.

ATTACHMENT 1
(Maps To Nearest Hospital & Fire Department)

#1 Insurance Site
for Ease of Use-
Progressive.com

Coupons: Print FREE Coupons from your computer!

Grocery Coupons	Store Coupons	Online Coupons	Free Stuff	coolsavings.com

Welcome, Guest User

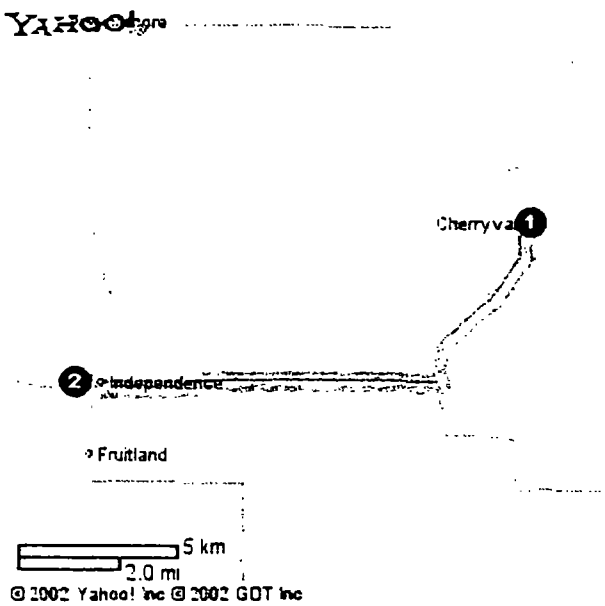
Yahoo! Yellow Pages

Starting from: Cherryvale, KS

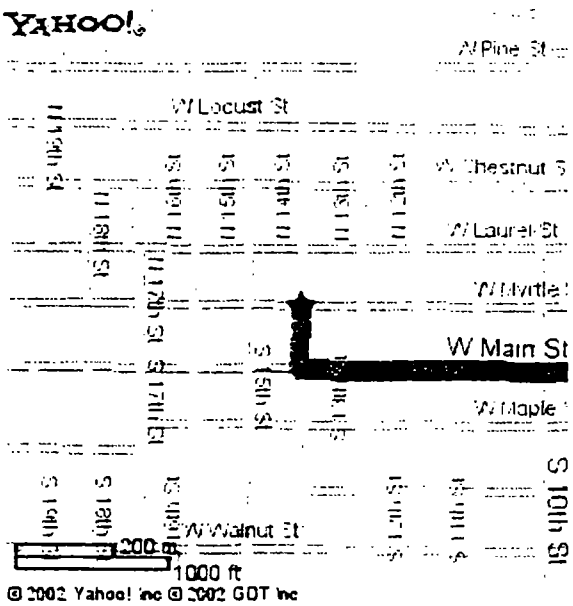
Arriving at: ★Mercy Hospital
800 W Myrtle St, Independence, KS 67301-3240
(620) 331-2200

Distance: 11.3 miles **Approximate Travel Time:** 19 mins

- Email Directions
- Get Reverse Directions
- Text Only Driving Direc



Full Route



Destination

	Directions	Miles
1.	Start on **W 3RD ST** going towards **US-160**	0.3
2.	Turn Left on **US-160**	11.0
3.	Turn Right on **N 14TH ST**	0.1
4.	Arrive at destination	

When using any driving directions or map, it's a good idea to do a reality check and make sure the road exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an in planning.

YAHOO! Yellow Pages

Home - Yahoo! - Maps - Address Book - He

Flights Find great fares that are available when you are. Go! Travelocity.com

Welcome, Guest User

Create My Favorite Locations - Sign

Yahoo! Yellow Pages

Top > Community > Government > Fire Protection

Search

Search Public Records on Cherryvale Fire Chief Before You Call

Cherryvale Fire Chief

116 S Neosho St, Cherryvale, KS 67335
Phone: (620) 336-2121

Email this Business Listing

Save to Yahoo! Address Book

Find Nearby

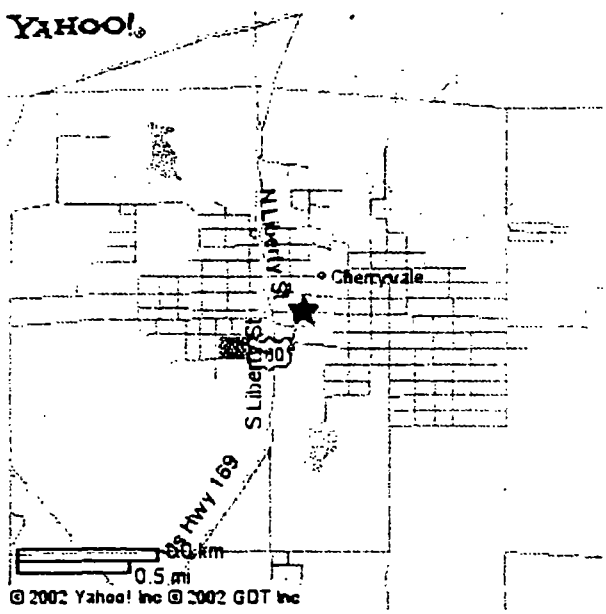
Related Categories:

- Fire Departments

Popular Categories:

- Restaurants
- Department Stores
- Entertainment & Arts
- Hotels
- Find Nearby

Map and Directions



Interactive Map

Driving Directions

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ID#: 70729

ATTACHMENT 2
(Preliminary Site Entry Evaluation Form)

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
10010 east 16th Street
TULSA, OK 74128
ENGINEERING - ENVIRONMENTAL - CONSTRUCTION
(918) 665-6575 - FAX(918) 665-6576

PRELIMINARY SITE ENTRY EVALUATION FORM

SITE NAME: _____ PROJECT NUMBER: _____

CONDUCTED BY: _____ DATE: _____

BRIEF PROJECT DESCRIPTION: _____

DESIGNATED SPM: _____ DESIGNATED SCS: _____

PHYSICAL HAZARDS (INCLUDE TRIPS, FALLS, EXCAVATION HAZARDS, ETC.): _____

EXPOSURE HAZARDS (INCLUDE ACM, LBP, VOLATILES, ETC.): _____

IS PRELIMINARY MONITORING OR MATERIAL CHARACTERIZATION NEEDED? DESCRIBE: _____

IS MONITORING RECOMMENDED DURING PROJECT ACTIVITIES? DESCRIBE: _____

PPE REQUIRED (INCLUDE ROUTES OF ENTRY): _____

ARE SAFETY FEATURES OPERATIONAL ON EQUIPMENT TO BE USED? FIRE EXTINGUISHERS IN PLACE? DESCRIBE: _____

*Completed Preliminary Site Entry Evaluation Forms are kept in Appendix H.

FIGURE 5

ATTACHMENT 3
(Pre-Job Safety Orientation Signature Sheet)

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
10010 east 16th Street
TULSA, OK 74128
ENGINEERING - ENVIRONMENTAL - CONSTRUCTION
(918) 665-6575 - FAX(918) 665-6576

WEEKLY SAFETY MEETING FORM

TRAINING CONDUCTED BY: _____
DATE OF TRAINING: _____
SUBJECT: _____

NAME (PRINT)	TITLE / POSITION	SIGNATURE	DATE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

*Completed Weekly Safety Meeting Forms are kept in Appendix L

FIGURE 8