EXPANDED SITE INSPECTION (ESI) REPORT
FOR THE FORMER NATIONAL ZINC SITE
CHERRYVALE, MONTGOMERY COUNTY, KANSAS
EPA I.D. KSD98040698
VOLUME I

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT (KDHE)
BUREAU OF ENVIRONMENTAL REMEDIATION (BER)
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BER SCANNED
FEB 07 2013

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FOR THE FORMER NATIONAL ZINC SITE
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EPA I.D. KSD98040698
KDHE I.D. C306300026
VOLUME I (REPORT AND APPENDIX A-C)

March, 2001

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SECTION 1: INTRODUCTION

The Kansas Department of Health and Environment (KDHE) has a continuing cooperative agreement with the U.S. Environmental Protection Agency (EPA) to perform investigations of selected sites which are known or suspected to be impacted by hazardous substances, pollutants or contaminants. These investigations are performed under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and consistent with the National Oil and Hazardous Substances Contingency Plan (NCP) 40 CFR §§ 300.400-300.425.

This Expanded Site Inspection (ESI) was performed by the KDHE Bureau of Environmental Remediation (BER) as part of the cooperative agreement for the federal Fiscal Year (FY) 2000. The purpose of this ESI was to collect sufficient information at the National Zinc site to assess the threat posed to human health and the environment and to determine the need for further action under CERCLA/SARA consistent with the NCP. The ESI included the following activities: review of historical file information; sampling of environmental media; evaluation of the site utilizing the Hazard Ranking System (HRS) Pre-Score software to determine a site score for HRS purposes and documentation of HRS factors; and collection of relevant non-sampling information.

KDHE has collected a large amount of data has been through a Brownfields Targeted Assessment (BTA) and Removal Site Evaluation (RSE) conducted at the site; therefore the purpose of the ESI is to focus on the HRS considerations for inclusion of the site on the National Priorities List (NPL). The site has the CERCLA Information System (CERCLIS) EPA identification number **KSD980406698**.

SECTION 2: SITE LOCATION, DESCRIPTION, OPERATIONAL HISTORY

2.1. Site Location

The National Zinc site is located at the northwestern city limits of Cherryvale, Montgomery County, Kansas (see Figure 1) and is located along U.S. Highway 169. Cherryvale is a rural community with some light industry. The population of Cherryvale as of the last census was 2,464 persons (Reference 15). The geographic coordinates of the site are 39° 42' 30.0" North latitude and 96° 25' 00" West longitude (see Appendix D). The site is located in Section 8 in Township 32 South, Range 17 East (Reference 1). Figure 1 is the topographic map of the site area and Figure 2 illustrates the site location from aerial photographs.

2.2. Climate

The climate of Montgomery County is characterized as a continental climate that is typically warm to hot in the summers and cold in the winters with the majority of precipitation events occurring in the

spring and early summer. The average annual precipitation in Montgomery County is 36.95 inches per year. The average winter temperature is 36.8° Fahrenheit (F) and the average summer temperature is 78.4° F. Prevailing surface winds in Montgomery County are southerly with an average annual speed of 11 miles per hour. The maximum 24-hour precipitation event recorded for Montgomery County is 6.38 inches (Reference 3).

2.3. Site Description

The site consists of the former location of the National Zinc smelter facility and adjacent impacted areas. The site is bounded by an unnamed creek on the west side of the site, by Front Street on the south, and Montgomery County Roads 5200 (north boundary) and 5400 (east boundary). The former Cherryvale waste water treatment plant is located adjacent to the southeast corner of the site but has been decomissioned. The South Kansas and Oklahoma Railroad transects the site generally from southeast to northwest. A small Williams Pipe Line Company natural gas meter/valve station is located adjacent to the northern side of the railroad right-of-way in the southeastern portion of the site. The area is generally flat with approximately 30 feet of relief across the site. Residential and agricultural properties surround the site. The Cherryvale Rodeo Grounds is located along portions of the southern site boundary as is being evaluated as a separate Brownfields Targeted Assessment (BTA).

2.4. Site/Operational History

The National Zinc site consists of approximately 360 acres including the former National Zinc smelter facility on the northern edge of Cherryvale, Kansas. Historical review from Sanborn Fire Insurance maps and historical archive information available during the BTA indicates that the Edgar Zinc Company began construction of a primary lead and zinc smelter at the site in 1898. The facility initially was constructed with 1,800 retorts and 3 furnace buildings. By 1908 the smelter facility had 4,800 retorts and 24 furnaces. The 1928 Sanborn Map (the most recent available) also indicates the facility had four (4) massive ore roasters and 24 furnaces in operation, consistent with the 1908 configuration.

The Sanborn Maps indicate the facility as operating "day and night". This facility was recognized as the largest zinc smelter in the world until World War I. Nearly 500 employees worked at this facility at its peak, and the population of Cherryvale was nearly 8,000 during the early 1900s at the peak of the Edgar Zinc facility production. The Edgar Zinc facility was by far the largest employer and industrial facility in Cherryvale during its operational life. The location of the Frisco Railroad line at the eastern edge of the site in addition to plentiful shallow natural gas from oil and gas production in the local area provided the necessary transportation and energy resources for the Edgar Zinc facility. At least one half of the demand for primary zinc production was for galvanizing purposes. U.S. Steel Corporation may also have had some ownership interest in the Edgar Zinc Company around 1910. The facility operated as the Edgar Zinc Company until sometime after 1928, when it was reorganized as the National Zinc Company. Production appears to have declined through the 1930s when most active operations ceased.

Sludges and liquid wastes contaminated with heavy metals were contained in large settling ponds covering approximately 23 acres. The lagoons were used to contain runoff from an estimated 2,000 tons of slag and roasted ore. The National Zinc smelter facility permanently terminated operations on December 24, 1976. Presently, the site contains the encapsulated former lagoon, several abandoned buildings and building foundations, and the remains of the smelter operations. Figure 3 includes a portion of the Sanborn Fire Insurance Map for the former National Zinc smelter facility.

Incidents of surface water contamination in the 1950s were reported to KDHE by adjacent property owners when contaminated water breached the large pond. On April 1976, the site was investigated by KDHE following complaints from farmers regarding visual observations of contamination in Drum Creek and concern over the possibility of a fish kill or cattle illness from surface water consumption. KDHE personnel also inspected the site on September 27, 1977 for possible surface water or ground water pollution associated with facility run-off and seeps. At the request of KDHE, limited response actions were initiated at the site by the National Zinc Company in October, 1977. Beginning in 1979, approximately 95 million gallons of fluid from the lagoon was treated and discharged into the adjacent Drum Creek. Ore and sludge was removed from the site; some of the remaining sludge (approximately 300 tons) was encapsulated on site. The lagoon was filled with dirt and top soil, treated with lime, and planted with grass. Five monitoring wells were installed in the western and southern edges of the large pond. Analytical results of ground water samples collected in 1982, 1983, and 1984 showed high levels of cadmium and lead.

In an April 5, 1983 letter from KDHE to Mr. Vogel of National Zinc, the clean-up and closure of the surface impoundments were found to be satisfactory. National Zinc was advised by KDHE that erosion of top soil near the low-lying areas must be minimized, barren patches of land observed during a KDHE inspection must be reseeded, and ground water monitoring must continue on a quarterly basis. The letter further explained the need for a restrictive covenant to preserve the integrity of the waste disposal area during the post-closure maintenance period of the disposal areas. A restrictive covenant limiting use or development of the property was prepared in 1983 and still governs the site.

On August 17, 1987, a member of the Cherryvale City Council contacted KDHE and indicated the City had an opportunity to purchase the site and were concerned about responsibilities regarding the long term maintenance of the area, as well as response actions required if contamination was identified. An inspection of the site was performed and a large exposed area with no vegetation in the southern portion of the site was documented. A letter dated December 22, 1987 from KDHE to the City advised of potential liability should the City chose to purchase the property and stated KDHE's position that continued monitoring and maintenance of the site was warranted.

In addition, KDHE inspected the site in May 1995 following a City of Cherryvale inquiry into possible restrictive covenant termination and redevelopment of the property. Surface water, soil, sediment, and sludge/waste samples were obtained by KDHE personnel. Shallow ground water samples were also collected from existing monitoring wells installed around the lagoon. Laboratory analysis revealed

contamination of sludge, soil and sediment samples of selected Resource Conservation and Recovery Act (RCRA) heavy metals above the non-residential Risk-Based Standards for Kansas (RSKs). Lead was detected at a maximum of 176,750 mg/kg (RSK = 1,000 mg/kg), cadmium at 2,816 mg/kg (RSK = 1,000 mg/kg), and arsenic at a maximum of 240 mg/kg (RSK = 38 mg/kg).

Cadmium was detected in surface and ground water up to 0.111 mg/l, above its maximum contaminant level (MCL) of 0.005 mg/l. In July, 1996, sediment/sludge sampling indicated lead up to 1,786 mg/kg, above its non-residential RSK level of 1,000 mg/kg and cadmium in surface water up to 0.347 mg/l on-site in standing water. Preliminary Assessment (PA) and Site Inspection forms were completed by KDHE in 1981 and the site was assigned the CERCLA Identification System (CERCLIS) identification number KSD980406698.

2.5. Summary of Brownfields Targeted Assessment (BTA) Results

The BTA report is included herein by reference (Reference 4). Greater detail regarding specific BTA activities and discussions can be found in the 1999 BTA Report by KDHE/BER. The subsections below briefly summarize KDHE activities for the BTA and BTA results. Portions of the BTA are also included in Appendix H and I.

2.5.1 Surface Soil Results Summary

Approximately 659 *in-situ* X-ray fluorescence (XRF) soil analysis were conducted at the site during the 1999 BTA (this number does not include standards/calibration or other QC analyses). Of these, approximately 141 samples were submitted for laboratory analysis. Subsurface waste profile samples, surface water, sediment and ground water samples were also obtained at the site. Surface soil XRF detections ranged from non-detect through much of the northeastern and southwestern portions of the site to a maximum of 35,700 parts per million (ppm or mg/kg) lead at location N 6200 E 6700.

Cadmium was not detected in excess of its 1,000 mg/kg non-residential RSK value, although it was detected above its residential RSK level of 39 mg/kg across nearly all of the areas also indicating elevated lead levels. Arsenic also exceeded its non-residential RSK value of 86 mg/kg, at a maximum concentration of 306 mg/kg in seven (7) of the laboratory samples, or approximately 5 % of the laboratory samples. Four (4) of these seven (57 %) were associated with lead levels over 1,000 mg/kg, and six of the seven arsenic exceedences (86 %) were associated with lead levels greater than 400 mg/kg. In general, the elevated arsenic values are therefore associated with highly elevated lead values.

A distinct area of elevated lead concentrations in surficial soils was indicated by both XRF and laboratory in three (3) general areas. The first area generally trends with the existing railroad right-of-way. The second area is located around existing and former locations of production buildings south and immediately southwest of the railroad tracks. The third is downwind (north) of the primary

production areas, and may be the combined result of slag disposal as well as wind-blown air releases of particulate process waste from the former smelter facility. This apparent downwind area appears to be limited to approximately N 6500. Much of the northeastern portions of the site did not indicate a significant impact from heavy metals in both field XRF and laboratory confirmation samples. XRF detections ranged from non-detect through much of the northeastern and southwestern portions of the site to a maximum of 35,700 parts per million (ppm or mg/kg) lead at location N 6200 E 6700.

Nineteen (19) samples were submitted to DHEL for analysis by EPA Method 1311 for TCLP analysis. TCLP exceedences for cadmium (TCLP threshold 1 mg/l) and lead (TCLP threshold 5 mg/l) were identified in several samples. Lead indicated a maximum TCLP detection of 288 mg/l, well over its TCLP threshold of 5.0 mg/l, in composite sample C-1. This TCLP result, however, was in a composite sample from the initial sampling event and may be biased high. The maximum TCLP lead detection value in a grab sample location was 283 mg/l at location N 5500 E 6600. This location also yielded an elevated cadmium TCLP value of 3.5 mg/l. The maximum cadmium TCLP value of 70.2 mg/l was indicated at N 6200 E 6700, which also yielded the third highest lead TCLP value of 118.9 mg/l. This was the location of the maximum in-field XRF detection for lead (35,700 mg/kg). All lead TCLP exceedences were associated with cadmium TCLP exceedences. Eight (8) of the 20 TCLP samples failed TCLP for lead, and these same eight samples and one additional sample (nine total) failed TCLP for cadmium. Therefore, using an empirical relationship, roughly 89 % of all the lead TCLP exceedences were associated with cadmium TCLP exceedences. The TCLP failure threshold for cadmium appears to be at a minimum total cadmium concentration of 50.93 mg/kg at N 6000 E 7100 (TCLP value 1.382 mg/l). The minimum total lead concentration associated with a TCLP failure is 2,198.2 mg/kg at N 6400 E 6500 (TCLP value 8.687 mg/l). All lead TCLP exceedences were therefore correlative with total lead values exceeding non-residential RSKs.

Cadmium, however, appears to be more mobile and soluble under the site conditions, as TCLP exceedences were observed in relatively low (<100 mg/kg) soil concentrations. The relatively higher apparent mobility of cadmium is also a likely factor for the elevated cadmium surface water detections observed during the BTA. The preliminary TCLP results indicate some of the smelter waste and soil material may potentially be Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes D008 (lead) and D006 (cadmium) if generated as defined by § 261.24 of RCRA. .

2.5.2. Ground Water Results Summary

Heavy metals constituents, primarily cadmium, lead and chromium were identified from DHEL analysis of ground water samples from the site. Cadmium was detected at a maximum of 3.062 mg/l in TW-3, lead at a maximum of 0.136 mg/l and chromium at a maximum of 0.14 mg/l also in TW-3. The analytical results by DHEL indicated exceedences of the maximum contaminant levels (MCLs) for lead (.015 mg/l), cadmium (0.005 mg/l) and chromium (0.1 mg/l) in ground water at the site. Silver was also detected at a maximum of 0.113 mg/l, slightly above its lifetime health advisory level (HAL) of 0.1 mg/l. in TW-3. Cadmium exceeded its MCL in all samples obtained within or at the downgradient edge of

the smelter waste disposal area, in existing monitoring wells MW-1 (0.1 mg/l), MW-2 shallow (0.931 mg/l), and MW-3 (0.12 mg/l). Well MW-4 indicated cadmium at its MCL at 0.005 mg/l, and MW-2 deep did not indicate cadmium. Temporary wells TW-3 (3.063 mg/l), TW-4 (0.855 mg/l) and TW-5 (0.057 mg/l) all indicated cadmium above its MCL. A trend towards increasing cadmium concentrations beneath the smelter waste disposal area in ground water is apparent from the sample data. Lead and chromium were detected above MCLs only in TW-3, located in an area interpreted to be near the maximum thickness of smelter waste within the waste disposal unit. The maximum silver detection was also indicated in this sample. The area of elevated lead, chromium, and silver concentrations in ground water appears to be limited to within the disposal unit itself.

2.5.3. Surface Water and Sediment Results Summary

The primary constituent detected at elevated levels in surface water during the BTA was cadmium (detected in all surface water samples except SW-11). Chromium was detected in SW-1, and lead in SW-1 and SW-10. Arsenic was also detected in SW-1. Barium was detected in all surface water samples but SW-1 indicated the only barium detection greater than 1.0 mg/l. The maximum detection for all surface water constituents indicated above was at surface water sample location SW-1. Cadmium was indicated at 2.965 mg/l (MCL 0.005 mg/l), lead at 1.789 mg/l (MCL/action level 0.015 mg/l), arsenic at 0.063 mg/l (MCL 0.05 mg/l), and barium at 2 mg/l (MCL 2 mg/l). This location is the nearest surface water sampling location to the primary production areas and downstream of a former waste water lagoon.

Sample location SW-4, obtained at the exit point of the unnamed tributary of Drum Creek from the site, indicated cadmium at 0.088 mg/l, above its MCL of 0.005 mg/l. Cadmium was the only constituent elevated above its MCL immediately downstream of the site. Appendix I indicates surface water and sediment sample locations from the BTA. Since no detections for cyanide were indicated in surface water and ground water near the waste disposal area, further sampling for cyanide was not performed. The BTA surface water (SW) locations should not to be confused with the ESI SW sample locations which are located on Figures 4-5. The BTA Report should be consulted for the BTA surface water locations and results which are summarized in Appendix I.

2.5.4. Subsurface Waste Profile Results Summary

Subsurface waste profiles indicate that smelter waste is typically limited to the disposal unit itself, although near the buildings some areas may have smelter slag mixed with the former structure foundations. Apparent waste thicknesses varied between 0 and seven (7) feet of apparent waste thickness as determined visually. Smelter waste was visually logged to determine apparent smelter waste thickness across the site. The generalized smelter waste thickness observed during the BTA is included in Appendix I. Temporary well borings were also logged for waste thickness and were included in the waste thickness map. Selected cuttings from temporary well borings were also bagged

and analyzed in-field with the Niton XRF. An apparent maximum waste thickness of seven (7) feet was observed in waste profile location (WP)-4.

2.6. Summary of Cherryvale Private Yards Removal Site Evaluation (RSE)

At least eleven (11) residential yards were determined to be impacted in the KDHE RSE. The RSE was conducted in the residential areas immediately adjacent to the south of the National Zinc site. Samples from 0-6" were obtained in residential yards and analyzed with KDHE's Niton XRF unit. Approximately 33 % of the XRF sample analyses were submitted for laboratory confirmation. At least one sample in each of the 11 yards indicated lead in excess of the three times (3X) background concentration of 627 mg/kg. Cadmium and arsenic were also detected above 3X background in several residential yards. Lead was detected at a maximum of 3,680 mg/kg in the 618 Front Street residential yard. Cadmium and arsenic were identified above KDHE residential RSK values but were identified to be generally coincident with total lead values over 1,000 mg/kg.

The RSE concluded that additional removal site evaluation consistent with § 300.410 of the NCP was appropriate to evaluate additional residential yards to the south of those evaluated for the RSE. The RSE also concluded that further removal response actions consistent with § 300.415 of the NCP were appropriate for the residential areas evaluated for the RSE. The full extent of residential yard contamination was not identified in the RSE and a Phase II RSE is currently in the planning stages by KDHE. Sufficient information is present from valid data collected during the KDHE RSE to evaluate the soil exposure pathway for this ESI and HRS purposes, although the Phase II RSE will certainly add to the overall site characterization and determination of extent of impact to residential yards for removal response actions. The RSE is included as Appendix C.

2.7. Hazardous Substance Characteristics

The primary contaminants of concern at the National Zinc site are lead, cadmium, mercury, zinc and arsenic. Additional information concerning the properties, uses, and health effects of these constituents is included in Appendix E (Reference 9).

SECTION 3: FIELD ACTIVITIES AND ANALYTICAL RESULTS

3.1. Quality Assurance Project Plan

A site-specific Quality Assurance Project Plan (QAPP) was developed and followed for the National Zinc site. Site activities were divided into two basic task areas. The first task area was review of the previously collected data for the BTA and prior investigative activities as well as review of the more recent Cherryvale Residential Yards RSE Report. The review is summarized in the sections above, and the ESI was focused primarily on identifying data gaps or limitations in the available data consistent with HRS criteria which would be necessary to fill in order to facilitate HRS package completion and NPL

listing. The primary data gap identified after review of the BTA and RSE reports was the lack of observed release criteria consistent with the HRS for the surface water pathway. The ESI field effort then concentrated on collecting the surface water data necessary to complete the HRS information needs.

3.2. Sampling Activities

The KDHE field team of Randy Brown and John Cregan conducted surface water and sediment sampling at the National Zinc site in February, 2001. The surface water and sediment samples were collected according to the rationale indicated below:

- **SB-**U was collected as the upstream background sample for Drum Creek;
- **SW-1** was collected as the source attribution sample from the former waste water lagoon and waste piles from the former National Zinc site source areas;
- **SW-**2 was collected at the probable point of entry (PPE) at the convergence of the unnamed tributary draining the National Zinc site and Drum Creek;
- **SW-3** and **SW-4** were collected as downstream samples within Drum Creek.

Disposable sampling equipment was used and therefore no rinsate sample was collected for surface water/sediment samples. Surface water samples were directly obtained into sample bottles unfiltered, and sediment samples were collected by obtaining 4 ounces of sediment at the surface water location into the prepared 4 oz. sample jar with a disposable trowel.

The tables and figures in Section 9 contain sample locations and results. Samples were analyzed by KDHE's Health and Environment Laboratory (DHEL). Samples were submitted for Resource Conservation and Recovery Act (RCRA) metals analysis by EPA Methods 6010, 6210 and 245.2, and 7471.

3.3. Analytical Results

3.3.1. Surface Water Results

Cadmium and zinc were detected in several samples above a three times (3X) background concentration in the surface water samples collected for the ESI. Cadmium was detected at 0.082 mg/l at SW-1 (source attribution location) and 0.059 mg/l at SW-2 (PPE location), above its 3X background concentration of 0.015 mg/l. Zinc was detected above its 3X background concentration of 0.057 mg/l at SW-1 (1.957 mg/l), SW-2 (1.256 mg/l), and SW-4 (0.069 mg/l.). An observed release of cadmium and zinc to surface water at the National Zinc site has thus been indicated by the surface water data.

3.3.2. Sediment Results

Sediment samples were also obtained at the same locations as the surface water samples. Mercury was detected above its 3X background concentration of 0.0297 mg/l at SED-1 (0.0876 mg/kg) and SED-2 (0.0319 mg/kg). Cadmium was detected above its 3X background concentration of 25.9 mg/kg in SED-1 (165.81 mg/kg) and SED-2 (160.42 mg/kg). Lead was detected above its 3X background concentration of 108.33 mg/kg in SED-1(1,294.61 mg/kg) and SED-2 (189.64 mg/kg). Zinc was detected above its 3X background concentration of 277.11 mg/kg in SED-1 (9,877.32 mg/kg), SED-2 (4,377.07 mg/kg), SED-3 (306.16 mg/kg) and SED-4 (517.02 mg/kg). An observed release of mercury, lead, cadmium, and zinc to surface water via sediment results has thus also been indicated by the National Zinc ESI analytical results.

3.3.3. Surface Soil Results

These are summarized above from the Cherryvale Residential Yards RSE Report and discussed in Section 6 below (Soil and Air Pathway/Targets).

3.3.4. Quality Control (QC) and Data Evaluation

The quality control (QC) samples obtained for the Cherryvale Residential Yards and National Zinc BTA investigations were within acceptable limits and data from those investigations was accepted at 100 % completeness. The QC results are discussed in greater detail in the National Zinc BTA and the Cherryvale Residential Yards RSE Reports, respectively. Laboratory data used in the ESI was validated consistent with KDHE's Quality Management Plan (QMP) by a member of the Site Assessment Unit of KDHE/BER who had no direct involvement with the acquisition of data for this project. Laboratory data was determined to be acceptable at 100 % completeness.

3.4. Analytical Conclusions

The ESI analytical results confirmed an observed release of the heavy metals mercury, cadmium, lead, and zinc to surface water from the former National Zinc smelter works as documented in the ESI surface water and sediment sample results. An observed release of lead, cadmium, arsenic and mercury to surface soils has also been identified from the Cherryvale Residential Yards RSE Report. Source attribution to the former National Zinc smelter works is present from valid data documented in the 1999 KDHE BTA, the Cherryvale Residential Yards RSE Report and this ESI Report.

3.5. Removal Considerations

A Preliminary Removal Site Evaluation/Removal Preliminary Assessment and Removal Site Evaluation (PRE and RSE) was conducted at the Cherryvale Residential Yards site. The Cherryvale Residential Yards RSE Report can be consulted for a more detailed discussion of off-site residential yard impacts.

The full extent of impacted off-site residential yards was not determined in the RSE and a Phase II RSE is currently in the planning stages by KDHE pending HRS and NPL finalization. Eligible conditions for a removal action consistent with § 300.410-300.415 of the NCP were identified during the initial RSE. Future removal response actions should be coordinated and consistent with long-term NPL response actions at the site.

Levels of lead above residential RSKs were identified within the property boundaries of 11 residences during the RSE. Levels of arsenic and cadmium were also identified above residential RSKs but are generally coincident with lead detections above 1,000 mg/kg, especially for cadmium. Some exceedences for arsenic were identified above RSKs but below the 3XMAX background concentration. Therefore lead should be used as the primary indicator compound for determining removal response options since the significantly elevated cadmium and arsenic detections appear to be coincident with lead detections.

Although sufficient data exists for completion of this ESI, the additional residential sampling data is valuable for characterizing the extent of impact of the heavy metal constituents detected at the site to additional residential yards for further removal response consideration and/or additional side-wide remedial actions taken pursuant to NPL listing. A Brownfields Targeted Assessment (BTA) is also currently underway at the adjacent Rodeo Grounds site which will also contribute data to the overall site characterization.

3.6. Enforcement Considerations

Potentially responsible party (PRP) searches for the National Zinc site have not successfully identified any PRPs to date. Both KDHE and EPA are currently in the process of identifying PRPs for the National Zinc site.

SECTION 4: GROUND WATER PATHWAY

4.1. Hydrogeologic Setting

4.1.1. Soils

The undisturbed areas of the site are typically underlain by the Kenoma series soils. The Kenoma soils are generally deep, moderately well drained, very slowly permeable soils on uplands, of 0 to 2 percent slopes. The surface layer (A horizon) typically consists of a dark grayish brown silt loam about 6-12 inches thick. The upper portion of the subsoil layer (B horizon) is typically 9 inches thick and consists of very dark grayish brown to grayish brown silty clay. The lower portion of the subsoil layer is typically 40 inches thick and consists of dark yellowish brown to dark brown to reddish brown silty clay.

Typical depth of Kenoma soils averages 60 inches or greater. The southern edge of the site is also within the Dennis series, but the native soil profile for this series is very similar to the Kenoma series. No C horizon is recognized because of the generally deep (60 inches) thickness of these soil types.

The unified soil classification of the A horizon is CL to CL-ML to ML (18-29 % clay) with a plasticity index range of 3-18 and a liquid limit range of 24-40. The unified soil classification of the B horizon is CH (40-60 % clay) with a plasticity index range of 30-48 and a liquid limit range of 50-75. Available water content is high (0.10-0.24). Surface runoff is slow (0.2-0.06 in/hr) and shrink-swell potential is high, especially below 12 inches. Permeability generally ranges from 0.2 to 0.6 inches/hour (Reference 3).

4.1.2. Hydrogeology

The site is located in a broad, low-relief upland of the Osage Questas physiographic area of southeast Kansas. Bedrock of Pennsylvanian age is present at the base of the soil profile. During the installation of temporary monitoring wells at the site, bedrock was typically encountered between 14 feet (TW-1) and 3.5 feet (TW-8). The location of TW-8 is in the new U.S. 169 right-of-way which was excavated approximately 6-10 feet for installation of the highway, and the depth to bedrock from surface in TW-8 is not representative of native conditions.

The bedrock units underlying the site are believed to be composed of sandstone and limestone of the Cherryvale Shale and Dennis Limestone Formations of the Kansas City Group. A yellowish to reddish-brown sandstone was typically encountered as the bedrock layer upon auger refusal. Ground water occurrence within the Cherryvale Shale and Dennis Formations is typically localized with very low (less than 3 gallons per minute) yields of generally poor quality. These bedrock units typically yield little to no water except in the shallow weathered zone near the upper bedrock surface. Oil field intrusion of brines in the site area from oil production fating back to the early 1900s has impacted shallow ground water quality regionally in this portion of Southeast Kansas (References 4 and12).

Ground water occurrence in the site area is primarily restricted to unconsolidated alluvial deposits of the Verdigris River and Drum Creek. The City of Cherryvale receives water from a surface intake on Big Hill Lake located approximately five (5) miles east of Cherryvale. Significant karst terrain does not exist in the site area given the sequential shale-sandstone-limestone stratigraphy of the bedrock units. A detailed stratigraphic sequence is included as Figure 11. The City of Cherryvale and Montgomery County Rural Water District # 12 supplies water to private residences surrounding the site.

4.2. Ground Water Targets

The entire population of Cherryvale relies on surface water from Big Hill Lake for the its public water supply (PWS). Big Hill Lake is located upstream of surface drainage from the National Zinc site. The Verdigris River upstream of the site near Neodesha supplies Montgomery County Rural Water District #12. Only three (3) domestic wells were identified within one mile of the site, and the nearest well (3/4 mile) is located northeast of the site in an apparent upgradient direction. Well water quality in this

portion of Montgomery County is reportedly marginal due to sulfates and excessive hardness (References 4 and 12). A review of available water well records indicate 17 wells within 4 miles of the site (References 4, 12, 14, 15, 22). The breakdown of numbers of ground water targets by distance from the site is:

Distance:	Number of Wells:	Number of Targets:
0-1/2 mile	0	0
½-1 mile	3	7
1-2 miles	2	5
2-3 miles	10	24
3-4 miles	2	5
Total:	17	41

In summary, the total number of potential ground water targets at the National Zinc site is approximately 41 persons using 1990 Census figures. Figure 9 illustrates ground water targets in the site area.

4.3. Ground Water Conclusions

A release of heavy metals, especially cadmium, chromium, lead and silver has been documented in ground water at the site. Lead, chromium, and silver were detected above respective MCLs or other action levels in one ground water sample (TW-3) obtained during the BTA. Cadmium was detected above its MCL in seven (7) of the ground water samples including at the downgradient site perimeter. Cadmium levels in ground water appear to be generally associated with former production areas and especially the former wastewater lagoons which were filled with waste and soil fill and capped.

A ground water sample obtained east of the railroad tracks (TW-9) in an upgradient direction from the production and waste disposal areas did not indicate elevated levels of cadmium, lead, chromium or silver. Heavy metals releases to ground water observed at the site are therefore attributable to the former National Zinc facility.

Elevated cadmium levels were observed downgradient from the former production areas (0.057 mg/l in TW-5) but were most elevated in ground water samples obtained in the waste disposal area/former lagoons (3.062 mg/l in TW-3). Ground water samples were not obtained downgradient of the site since the downgradient temporary wells did not yield sufficient water to develop and sample the wells.

The ground water pathway is not the most significant exposure pathway at the site for HRS purposes given the few private wells near the site and the low availability and quality of local shallow ground water. Evidence is also present to indicate that the creek surrounding the berm of the former waste disposal area may be a shallow ground water barrier and consequently base flow to surface water is probably a greater concern at the site. Approximately 41 potential ground water targets were identified within a 4-mile radius of the site.

SECTION 5: SURFACE WATER PATHWAY

5.1. Hydrologic Setting

An intermittent stream drains the site and enters Drum Creek approximately 3/4 mile from the site. Drum Creek enters the Verdigris River approximately seven (7) linear miles from the site. This unnamed intermittent stream basically drains the entire site, including the former productions areas, remaining smelter slag pile/waste areas, and the area of the lagoon cap. Drum Creek enters the Verdigris River downstream of the City of Independence's surface water intake. The unnamed intermittent streams crossing the site which also form the boundaries of the waste disposal area and leave the site at the western edge of the waste disposal area are within the 100-year floodplain of Drum Creek

5.2 Surface Water Targets

No primary surface water targets have been identified within the 15-mile downstream target distance limit. No surface water intakes were identified along the 15-mile target distance limit. The Verdigiris River and Drum Creek have been designated as critical habitats for the butterfly mussel, the Neosho mucket mussel, the Ouachita kidneyshell mussel, and the rabbitsfoot mussel. Several other threatened or endangered or threatened species occur in Montgomery County that may be potential environmental targets at the site. These are as follows:

Species	Status	Occurrence in County
Bald Eagle	E	Occurs occasionally in winter
E. Hognose Snake	T	May occur in suitable habitat
E. Spotted Skunk	T	May occur in suitable habitat
Eskimo Curlew	E	Former spring migrant, last sighting 1902
Least Tern	E	Occurs occasionally in summer
Peregrine Falcon	E	May occur occasionally in winter
Piping Plover	T	May occur occasionally, spring or fall
Snowy Plover	T	May occur occasionally, spring or summer
White-faced Ibis	T	May occur occasionally at wetlands
Whooping Crane	E	Occurs occasionally, spring and fall
American Burying Beetle	E	May occur in suitable grasslands and uplands
Common Map Turtle	T	May occur in streams, lakes and oxbows
Western Fanshell	E	Generally associated with shallow riffles

T=threatened E=endangered

Other potential targets for the site include recreational fisheries of Drum Creek and the Verdigris River upstream of Coffeyville, Kansas and downstream of the confluence of Drum Creek and the Verdigris River. The *Surface Water Register of Kansas* indicates Drum Creek is designated for food procurement and aquatic life support (Reference 20). The Verdigris River is designated as aquatic life support, contact recreation, domestic water supply, food procurement, ground water recharge, industrial water supply, irrigation, and livestock watering. The Kansas Department of Wildlife and Parks further indicates that Drum Creek is also used for contact recreation and recreational fishing downstream of the National Zinc site (Reference 32).

5.3 Surface Water Source Area Discussion

Documentation reviewed during preparation of the ESI identified a consulting engineer's report for the National Zinc Company in the KDHE National Zinc file that the surface area of the former National Zinc lagoon was "at least 20 acres" (Reference 23 and Appendix F). An area of 20 acres was therefore used for HRS purposes. Since the lagoon has been filled only the area (and not volume) is pertinent according to the HRS (References 27 and 31).

5.4 Surface Water Conclusions

A release of the hazardous substances mercury, lead, cadmium and zinc to surface water at the National Zinc site has been observed and documented through analytical results from surface water and co-located sediment samples. Drum Creek is a fishery and is habitat for several threatened and endangered species. Drum Creek is also used for contact recreation downstream of the National Zinc site. Source attribution data collected during the ESI and review of the BTA data verifies that the former National Zinc smelter works is the source for releases of heavy metals to surface water (and sediments) observed during the ESI.

No primary surface water targets have been identified, but potential surface water targets include the recreational fisheries of Drum Creek and the Verdigris River with transient recreational contact along the target distance limit.

SECTION 6: SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

Prevailing wind in Montgomery County is from the south (Reference 3). The site is located in a mixed residential and light industrial area at the northern city limits of Cherryvale, Kansas. The nearest school is within one mile of the site boundaries. The National Zinc site is accessible to the public and is not fenced. The nearest residences are located within 200 feet of the site boundaries.

6.2 Soil and Air Targets

The total population within four miles of the site is 3,132 estimated at persons based on United States Geological Survey topographic maps of the area and population census statistics for Montgomery County (References 2, 15, 17). The entire population of Cherryvale lies within four miles of the site and would be considered as potential soil targets.

The extent of surficial soil contamination appears to extend south to the adjacent residential area as was identified in the KDHE Cherryvale Residential Yards RSE. Source attribution data was identified in review of the BTA and RSE Reports which indicate by analytical data that the former National Zinc smelter works are the source for observed releases of heavy metals to the residential yards south of the site. Elevated levels of all of the constituents of concern identified for resident individual targets have

been attributed to source(s) at the former National Zinc smelter works and adjacent impacted areas either through data collected during the BTA, RSE or this ESI.

Observed release criteria for HRS purposes were met during review for the ESI for lead, cadmium, arsenic and mercury. Thirteen (13) residential Level II targets were identified for lead. Lead detections above the 3XMAX concentration of 627.1 mg/kg are considered only Level II targets since no Superfund Chemical Data Matrix (SCDM) risk benchmark exists for the soil exposure pathway for HRS purposes. These results are documented in the RSE Report (Reference 7) and included as Appendix C. Five (5) residential Level I targets were identified for cadmium, and four (4) Level I residential targets were identified for arsenic. No residential Level II targets were identified for arsenic, and nine (9) Level II residential targets were identified for mercury through valid data collected during the RSE and evaluated for this ESI (Reference 7).

At a population per residence of 2.42 persons/residence the breakdown of soil targets is as follows:

Lead:	0 Level I Targets	31 Level II Targets
Arsenic:	10 Level I Targets	0 Level II Targets
Cadmium:	10 Level I Targets	12 Level II Targets
Mercury:	0 Level I Targets	22 Level II Targets

Approximately 20 workers are also present at the site between the City of Cherryvale personnel accessing city storage buildings and the former waste water treatment plant at the southeastern edge of the site, the Southeast Kansas and Oklahoma railroad personnel and the Williams Natural Gas personnel maintaining the meter station located within the site boundaries.

6.3 Source/Quantity Calculations (for HRS Considerations)

The area of contaminated soil was determined by reviewing the observed area of lead (which yielded the greatest area) above three times background. Both XRF and laboratory data were reviewed to provide the optimum area of contaminated soil for HRS purposes. Measuring from aerial photographs and topographic maps with overlays of BTA, RSE and ESI data, an area of 145 acres (6,316,200 square feet) was calculated as the area of the contaminated soil source attributed to the National Zinc site for HRS purposes. Because of its relative toxicity factor in the HRS compared to cadmium or lead, arsenic was used for source attribution and extent for HRS purposes (References 27 and 31).

6.4 Soil and Air Conclusions

Surficial soil samples obtained at the site indicated levels of lead, arsenic and cadmium elevated above residential RSK benchmarks in residential areas. Levels in excess of non-residential RSKs were identified for lead and arsenic at the National Zinc site former smelter works apparent source area, and above residential RSKs for lead, cadmium, zinc and arsenic. An observed release of heavy metals from former smelting operations to soils at the National Zinc facility has been identified at the site from the BTA and RSE data included in this ESI (References 4 and 7). Cadmium and arsenic concentrations above 3XMAX background and residential RSKs were also identified in locations with

total lead levels in excess of 1,000 mg/kg. A total of Level I resident individuals, workers and potential soil and air targets were identified at the site for the ESI.

SECTION 7: CONCLUSIONS

KDHE conducted the ESI at the National Zinc site to summarize available data and fill data gaps for HRS purposes, especially with respect to the surface water pathway. Other investigations have recently been conducted by KDHE in the site area, including the KDHE National Zinc BTA and the Cherryvale Residential Yards RSE. The ESI was conducted to summarize and fill data gaps from these reports to satisfy HRS observed release and facilitate completion of the HRS package, and thus to expeditiously allow the site to proceed towards NPL listing. The BTA Report identified the former National Zinc smelter works as a source area for surface water, soils and ground water releases of heavy metals. The ESI, BTA and RSE results from the National Zinc site and adjacent residential areas all indicate that the apparent source area for heavy metals, especially lead and cadmium, in surficial soils and surface water/sediments is the former National Zinc smelter works. Elevated levels of lead, cadmium and arsenic are widespread across the former National Zinc site and are also present in residential areas to the south of the former National Zinc smelter works.

Observed release criteria have been met for the surface water and soil pathways. A release of zinc and cadmium to surface water have been identified from surface water samples obtained during the ESI. A release of lead, cadmium, mercury, and zinc to surface water have been identified through sediment sampling obtained during the ESI. An observed release of lead, cadmium, arsenic and mercury to surface soils has also been identified during this ESI from review of the National Zinc BTA and Cherryvale Residential Yards RSE information. Both Level I and Level II residential targets were identified for cadmium. Level I residential targets were identified for arsenic, and Level II residential targets were identified for lead and mercury. The pathways of greatest concern at the National Zinc site appear to be the soil and surface water pathways. Observed release criteria for HRS purposes appear to be met for both pathways as documented in this ESI. A release of the hazardous substances mercury, lead, cadmium and zinc to surface water in Drum Creek at the National Zinc site has been observed and documented through analytical results from surface water and co-located sediment samples.

The National Zinc smelter works was in operation between 1898 and 1976. From available historic information, a potentially responsible party (PRP) has not yet been identified for the National Zinc site. Further response actions are appropriate to address the environmental and exposure impacts identified in this ESI. Recommended response actions include continuation of PRP search information for successors to the National Zinc Company by KDHE and EPA. The site appears to be a candidate for completion of a Hazard Ranking System (HRS) scoring package and inclusion on the National Priorities List (NPL).

Further removal site evaluation is currently being planned by KDHE in the area south of the residential area recently evaluated for the KDHE Cherryvale Residential Yards RSE. The Cherryvale Residential Yards Phase II RSE will include sampling of additional yards to further evaluate removal response considerations consistent with § 300.415 of the NCP. It is recommended that the Phase II RSE

continue parallel with HRS package preparation and NPL listing consistent with § 300.425 of the NCP, since adequate information regarding the soil pathway appears to be present in this ESI to conclude that the National Zinc site is an HRS/NPL candidate. Future removal response actions at the site consistent with § 300.415 of the NCP appear to be appropriate from the Cherryvale Residential Yards RSE findings. Information from the current and future RSE activities will contribute to the overall site characterization at the National Zinc site. Future removal response decisions should be coordinated and consistent with overall remedial response objectives should the site proceed to NPL listing.

SECTION 8: REFERENCES

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4. Kansas Department of Health and Environment, *Brownfields Targeted Assessment of the National Zinc Site, Cherryvale, Montgomery County, Kansas*, KSD980406698, 1999.

5. Sanborn Insurance Maps, Cherryvale, Kansas, 1899-1928.

6. Montgomery County Register of Deeds Documentation.

7. Kansas Department of Health and Environment, *Removal Site Evaluation (RSE) for the Cherryvale Residential Yards Site*, KDHE I.D. # C306371097, 2001.

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9. U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, *Draft Toxicological Profiles*, 1994-1996.

10. Kansas Department of Health and Environment, *Quality Assurance Project Plan for the Removal Site Evaluation (RSE) for the Cherryvale Residential Yards Site*, 2001.

11. Kansas Department of Health and Environment, *Risk-Based Standards for Kansas* (RSKs), 2000.

12. Kansas Geological Survey, *Ground Water Series # GW-1: Geology and Ground Water Resources of Montgomery County, Southeastern Kansas*, 1974.

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14. Kansas Department of Health and Environment, Division of Environment, Bureau of Water Well Record Forms WWC-5 KSA 82a-1212.

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25. U.S. Environmental Protection Agency, *Guidance for Performing Site Inspections under CERCLA*, EPA/540/G-91/013, 1992.

26. U.S. Environmental Protection Agency, *Guidance for Data Usability in Site Assessment,* EPA/OSWER/9345.1-05, 1993.

27. U.S. Environmental Protection Agency, *National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Final Rule,* 40 CFR Part 300 et. seq., 55 FR 8666, 1990.

28. U.S. Environmental Protection Agency, *Quality Assurance/Quality Control Guidance for Removal Activities*, EPA/540/G-90/004, 1990.

29. U.S. Environmental Protection Agency, *Guidance on Conducting Non-Time Critical Removal Actions under CERCLA*, EPA/540/R-93/057, 1993.

30. U.S. Environmental Protection Agency, *Hazard Evaluation Handbook: A Guide to Removal Actions*, EPA Region III, 1997.

31. U.S. Environmental Protection Agency, *Hazard Ranking System Guidance Manual,* EPA/540/R-92/026, 1992.

32. Personal conversation between Peter Haxton, KDHE and Ernie Miller, Kansas Department of Wildlife and Parks Wildlife Biologist, February, 2001.

SECTION 9: TABLES AND FIGURES

System	Series	Stage	Group	Formation or rock unit	Thickness, in feet	Lithology	Water supply[1]
Quaternary	Pleistocene			Alluvium	0-60	Unconsolidated clay, silt, sand, and gravel. Basal part contains 0 to 14 feet of sand and gravel.	Yields moderate supplies of water to wells in parts of the Verdigris River valley and in major tributary valleys.
				Terrace deposits	0-38		Yields moderate supplies of water to wells in low terrace deposits. Intermediate and high terrace deposits yield lesser amounts to wells or may be above water table.
Pennsylvanian	Upper Pennsylvanian	Virgilian	Douglas	Lawrence Formation	140	Chiefly olive-gray shale. As much as 30 feet of sandstone in upper part. Thin bed of Haskell Limestone Member at base.	Yields very small supplies of water to shallow wells in weathered zones. Sandstone beds generally above water table.
				Stranger Formation	100-175	Gray shale and siltstone, and gray fine-grained sandstone. Thin bed of Westphalia Limestone Member in upper part.	Generally yields small to moderate supplies of water to wells in areas underlain by sandstone. Where sandstone beds are absent, yields very small to small supplies to shallow wells in weathered zone.
		Missourian	Lansing	Stanton Limestone	70-130	Consists of three limestone and two shale members. Limestones include fine-grained dense limestone, oolitic and sandy limestone, and fine-grained to coarsely crystalline limestone. Lower shale member locally includes a black fissile shale. Upper shale contains sandstone beds in outcrops in southern part of county.	Generally yields very small supplies of water to wells. Yields very small to small supplies of water to wells in areas underlain by thick limestone beds or shale. In southwestern part of county, yields very small to moderate supplies of water to wells in sandstone.
				Vilas Shale	50-120	Chiefly medium-gray shale.	Generally yields little or no water to wells except in the shallow zone of weathering.
				Plattsburg Limestone	0-70	Thick gray fine-grained to crystalline limestone in northern part of county. Thin or absent south of Elk River.	
			Kansas City	Bonner Springs Shale and Lane Shale	85-150	Gray silty to argillaceous shale.	
				Iola Limestone	2-10	Consists of two limestones separated by a black fissile shale containing phosphatic concretions. Lower limestone locally sandy or may be absent.	Generally yields little or no water to wells except in the shallow zone of weathering. Yields small supplies to wells locally from black shale.
				Chanute Shale	80-200	Chiefly gray shale and fine-grained sandstone. The Noxie Sandstone Member occurs extensively in the lower part and the Cottage Grove Sandstone Member in the upper part. The middle part contains the Thayer coal bed, one to three thin limestones, and gray shale.	Widespread aquifer. Generally yields small to moderate supplies of water to wells from sandstone beds at depths of as much as 400 feet.
				Drum Limestone	0-60	Light-gray fine-grained limestone and light-gray crossbedded very fossiliferous oolitic limestone.	Generally yields little or no water to wells except in the shallow zone of weathering.
				Cherryvale Shale	0-90	Chiefly bluish-gray shale with flagstones at top in outcrops in northern part of county. Flags increase in abundance southward.	
				Dennis Limestone	10-70	Light-gray to bluish-gray limestone, locally sandy or oolitic in upper part. Gray shale and black fissile shale in lower part. Locally contains a 1- to 4-foot thick limestone at base.	In northeast area, yields very small to small supplies of water to wells at depths of as much as 200 feet. Elsewhere, generally yields little or no water except in the shallow zone of weathering.
			Pleasanton	Coffeyville Formation	200	Chiefly medium-gray shale and siltstone. Upper part locally contains much fine-grained sandstone and several thin coals. Lower beds contain medium- to dark-gray and black shale. The Swope Limestone, 1 to 6 feet of gray limestone, occurs near the middle.	Generally yields little or no water to wells from the gray shales, siltstones, and thin limestones. Beds of sandstone and black shales locally yield small supplies of water to wells.
				Checkerboard Limestone	1-14	Consists of two thin limestones separated by gray shale where thickest. Lower limestone is brown-weathering crossbedded coquina.	
				Seminole Formation	5-10	Chiefly medium- to dark-gray shale. Locally contains a thin fine-grained sandstone at base.	
	Middle Pennsylvanian	Desmoinesian	Marmaton	Holdenville Shale	5-25	Gray and bluish-green fossiliferous shale.	Generally yields little or no water to wells.
				Lenapah Limestone	7-18	Upper massive limestone and lower nodular bedded limestone separated by a thin gray shale.	Yields very small to small supplies of water to wells generally less than 50 feet deep.
				Nowata Shale	3-30	Medium- to light-gray shale, locally contains some fine-grained sandstone.	
				Altamont Limestone	15-20	Upper and lower light-gray limestone members separated by gray and black fissile shale.	
				Bandera Shale	60-150	Gray shale and sandstone.	

[1] In this report, very small supplies refers to yields generally less than 1 gpm, small supplies to 1 to 5 gpm, and moderate supplies to 5 to 100 gpm.

FIGURE 11
GEOLOGIC PROFILE OF
MONTGOMERY COUNTY
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001

Source: "Geology and Ground-Water Resources of Montgomery County, Southeastern Kansas." *Kansas Geol. Survey Ground-Water Ser.* No. 1, 1974.

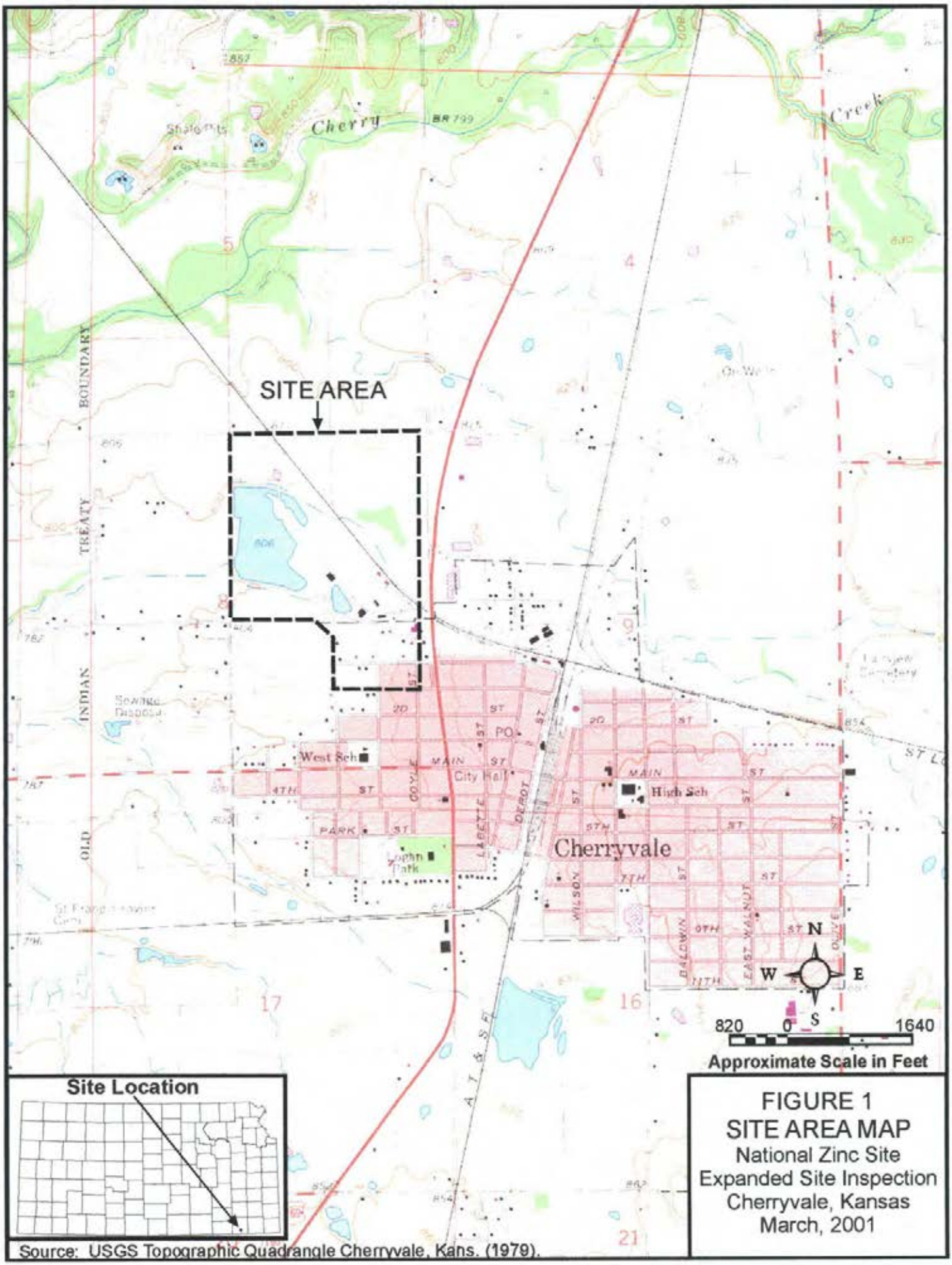
Table 1
Surface Water Results

Sample I.D.:	Lead (mg/l):	Arsenic (mg/l):	Cadmium (mg/l):	Zinc (mg/l):
SW-U (Upstream)	ND	ND	ND	0.019
SW-1	ND	ND	0.082	1.957
SW-2	ND	ND	0.056	1.256
SW-3	ND	ND	ND	0.040
SW-4	ND	ND	ND	0.069
3 X Background Concentration (mg/kg):	**ND**	**ND**	**ND (0.015)**	**0.057**

Table 2
Sediment Sample Results

Sample I.D.:	Lead (mg/kg):	Arsenic (mg/kg):	Cadmium (mg/kg):	Mercury (mg/kg):	Chromium (mg/kg):	Zinc (mg/kg):
Sed-U (Upstream/ background)	36.11	27.79	3.76	0.0099	17.91	92.37
Sed-1	1,294.61	48.39	165.81	0.0876	26.59	9,877.32
Sed-2	189.64	16.63	160.42	0.0319	16.33	4,377.07
Sed-3	24.29	ND	4.02	0.0072	12.61	306.16
Sed-4	56.60	29.69	6.74	ND	12.1	517.02
3 X Background Concentration (mg/kg):	**108.33**	**83.37**	**25.9**	**0.0297**	**53.73**	**277.11**

Note: All samples obtained 02-03/01. Violet indicates results over the three times (3X) upstream background concentration.
Analysis conducted by EPA Method 6010 (except mercury) and EPA Method 7471 (mercury) by DHEL
ND: Not Detected



Source: USGS Topographic Quadrangle Cherryvale, Kans. (1979).

FIGURE 1
SITE AREA MAP
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001

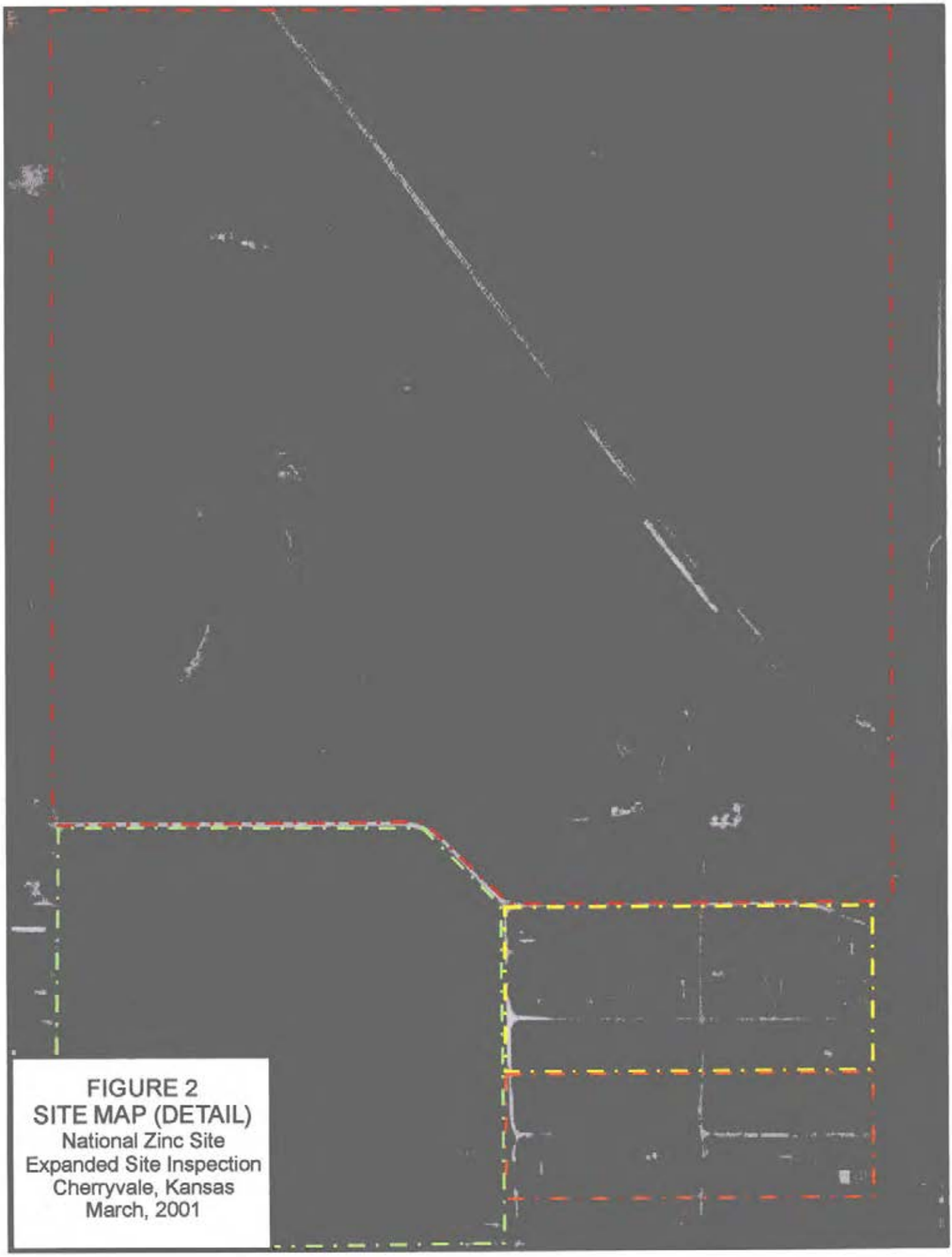
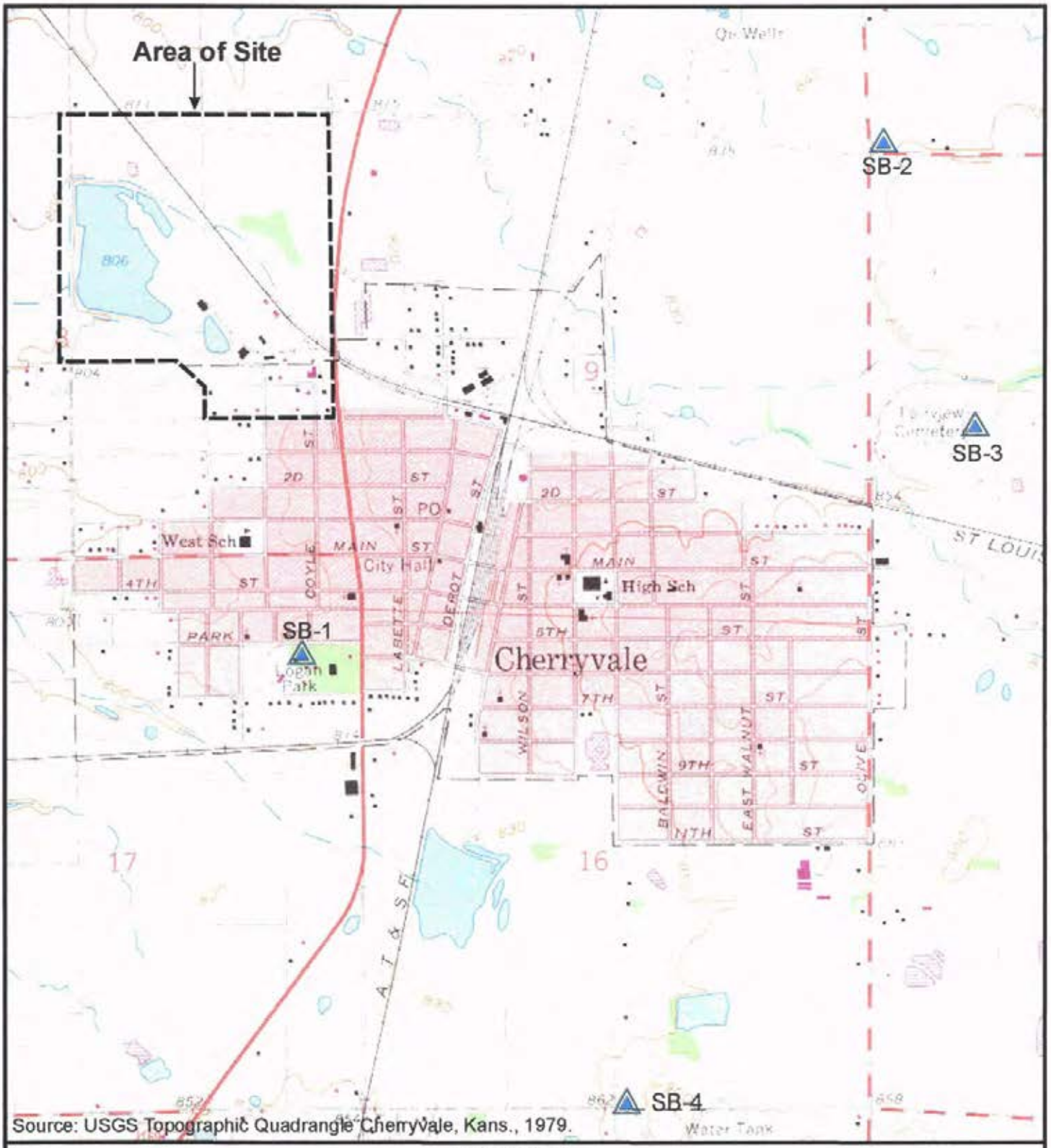


FIGURE 2
SITE MAP (DETAIL)
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001



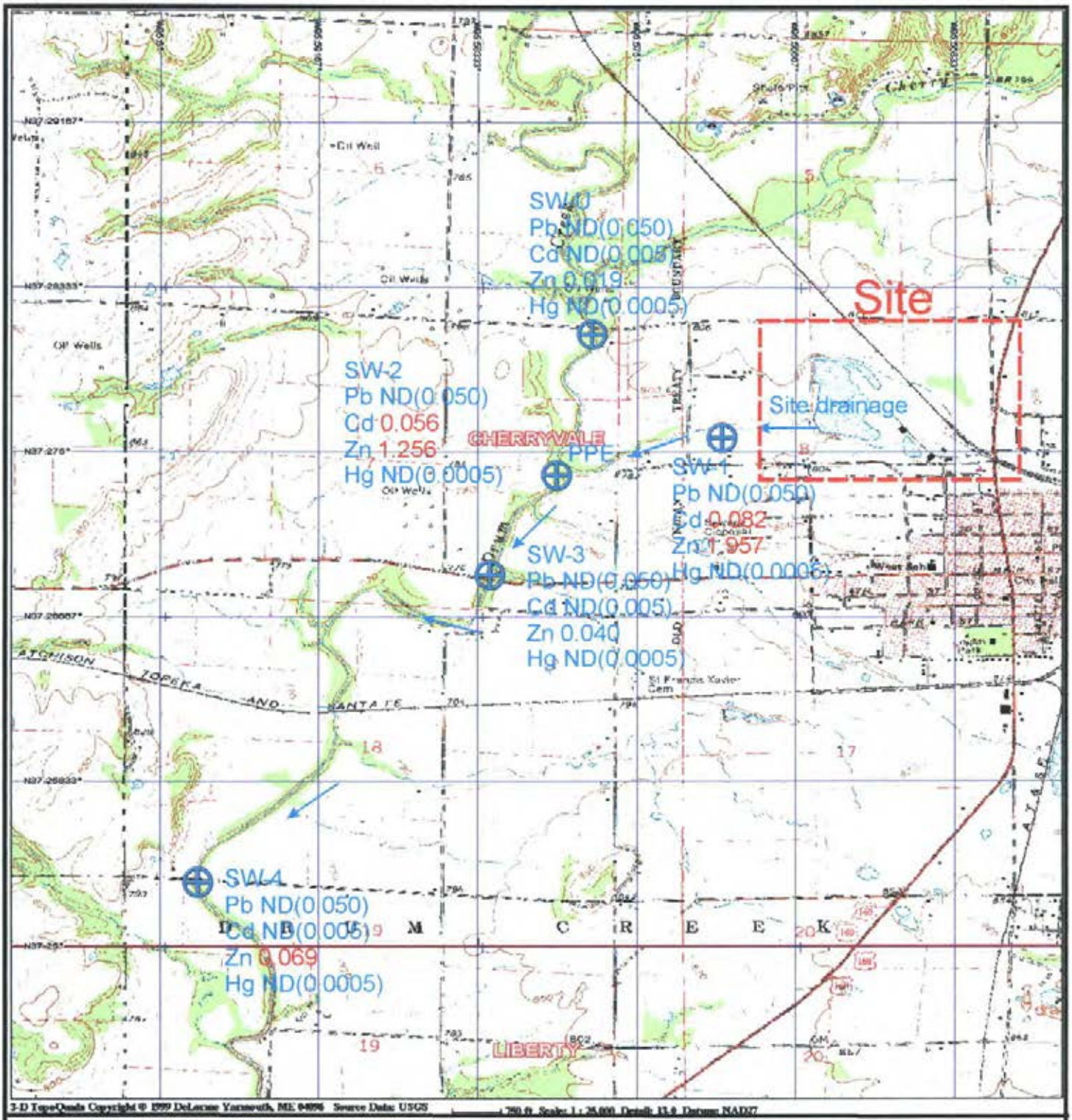
Source: USGS Topographic Quadrangle Cherryvale, Kans., 1979.

SB- Background Soil Sample Location

FIGURE 3
SITE AREA MAP WITH SOIL BACKGROUND SAMPLE LOCATIONS
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March 2001

N
W E
S

Approximate Scale: 1 inch = 1400 feet



Explanation:

Surface Water Flow Direction

Surface Water Sample Location with Analytical Results in mg/l

PPE - Probable Point of Entry to Perennial Stream

Pb - Lead, Cd - Cadmium, Zn - Zinc
Hg - Mercury

Results in red indicate concentrations greater than three times background

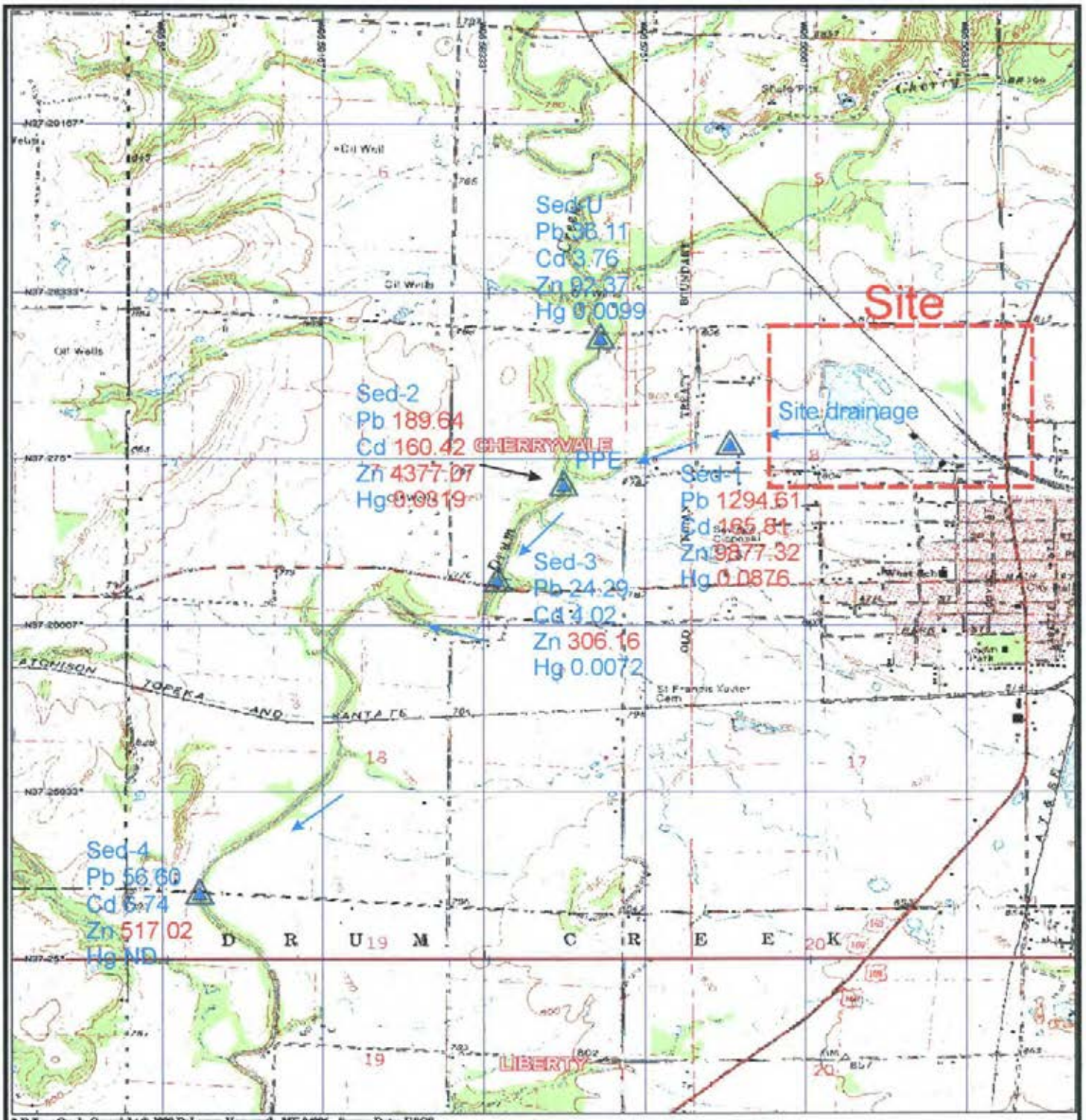
ND=None detected

FIGURE 4
SURFACE WATER SAMPLE LOCATIONS AND RESULTS
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas

N
W E
S

Approximate Scale: 1 inch = 1200 feet

Source: USGS Topographic Quadrangle Cherryvale, Kans., 1979.



Explanation:

Surface Water Flow Direction

Sediment Sample Location with Analytical Results in mg/Kg

PPE - Probable Point of Entry to Perennial Stream

Pb - Lead, Cd - Cadmium, Zn - Zinc
Hg - Mercury

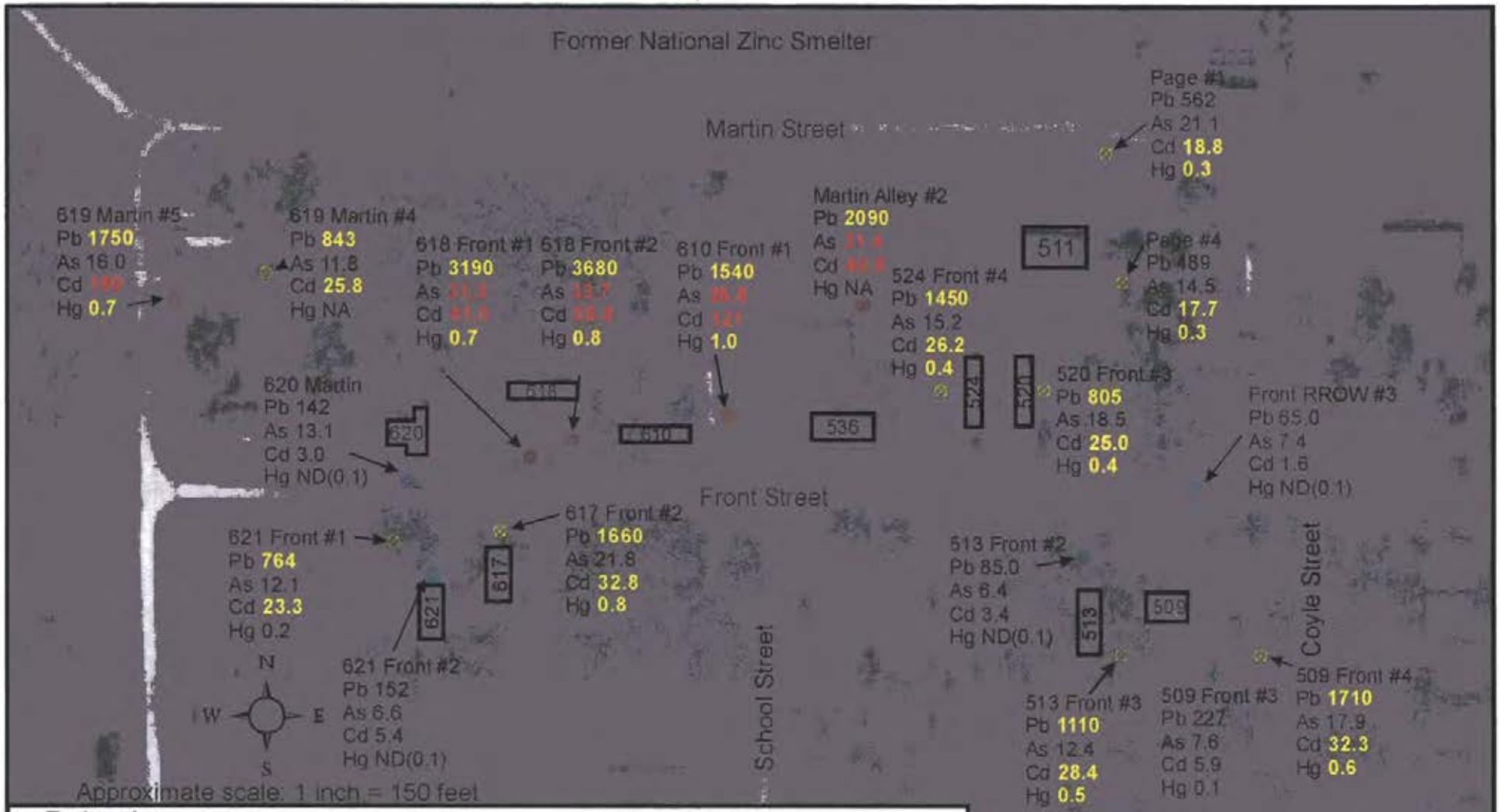
Results in red indicate concentrations greater than three times background

FIGURE 5
SEDIMENT SAMPLE RESULTS
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas

N
W E
S

Approximate Scale: 1 inch = 1200 feet

Source: USGS Topographic Quadrangle Cherryvale, Kans., 1979



Explanation:
- Soil Sample Location
- Concentrations below three times background
- Concentrations indicating Level I Contamination
- Concentrations Indicating Level II Contamination

All analytical results given in milligrams per kilogram (mg/kg).
Concentrations in yellow are greater than three times background concentrations (Level II).
Concentrations in red are greater than SCDM health-based benchmarks (Level I).
NA = Not analyzed.

Target Summary:

Level I Arsenic	3 residences
Level I Cadmium	4 residences
Level II Cadmium	4 residences
Level II Lead	10 residences

FIGURE 6
SOIL PATHWAY ANALYTICAL SUMMARY/TARGETS
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001

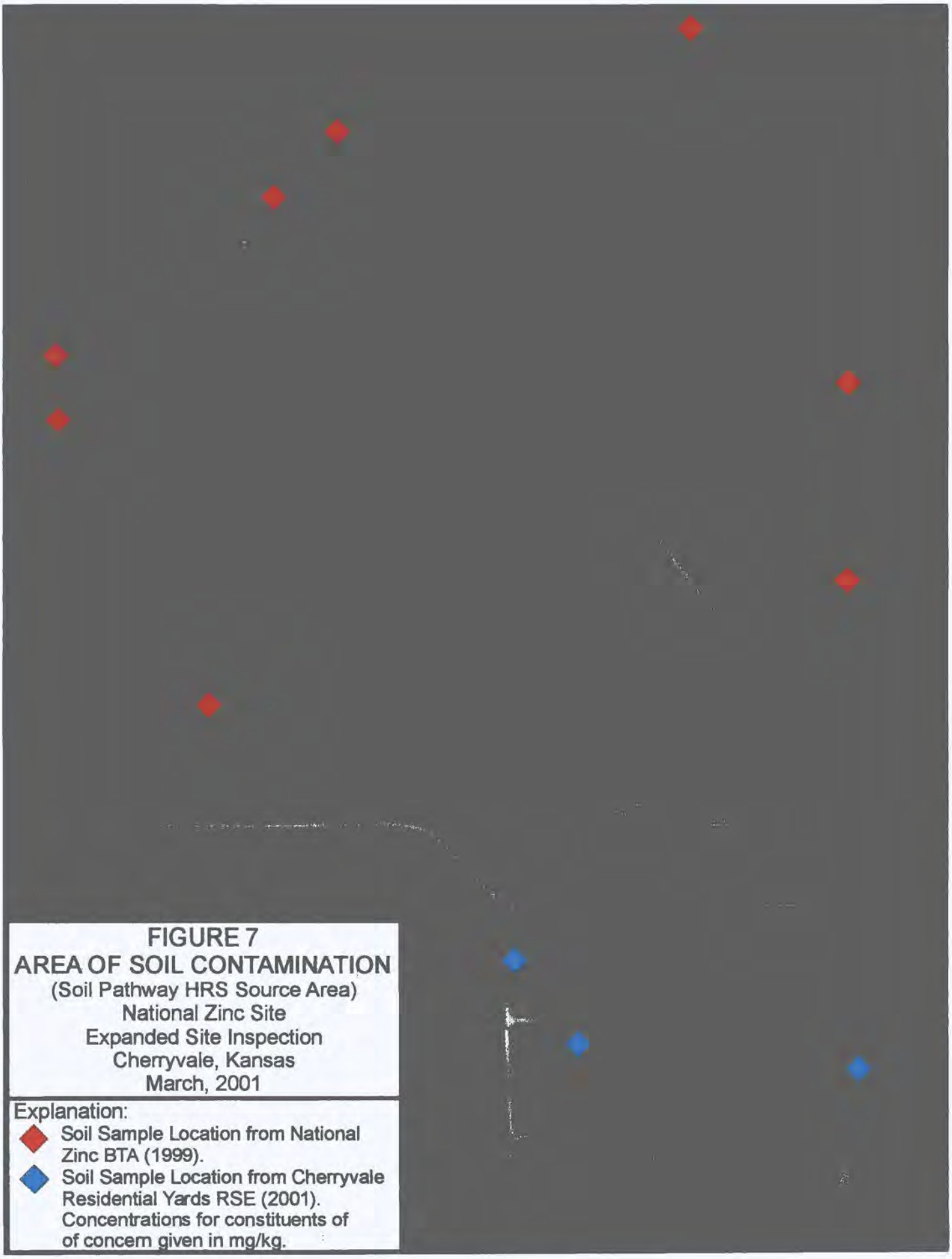


FIGURE 7
AREA OF SOIL CONTAMINATION
(Soil Pathway HRS Source Area)
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001

Explanation:

- Soil Sample Location from National Zinc BTA (1999).
- Soil Sample Location from Cherryvale Residential Yards RSE (2001).

Concentrations for constituents of of concern given in mg/kg.

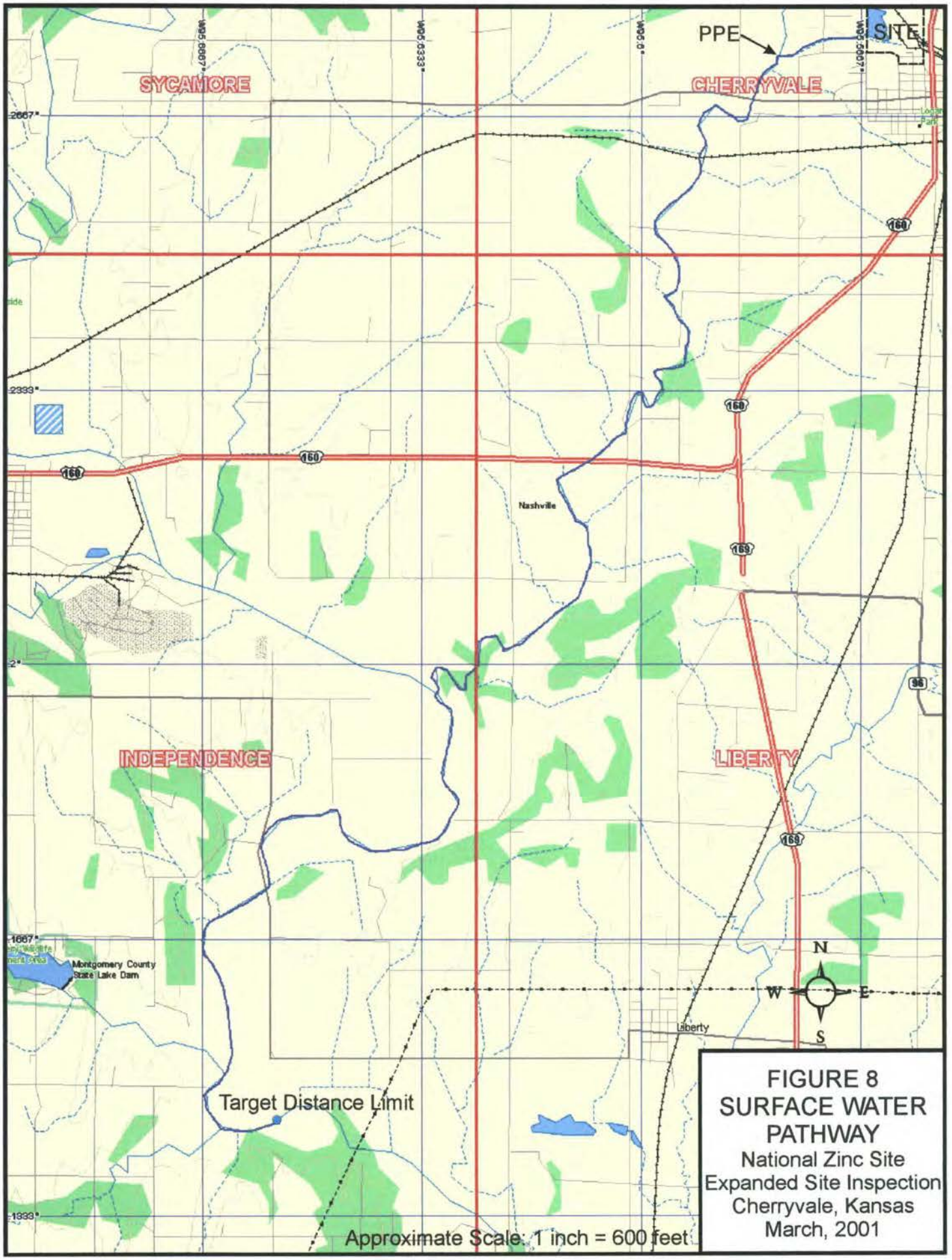
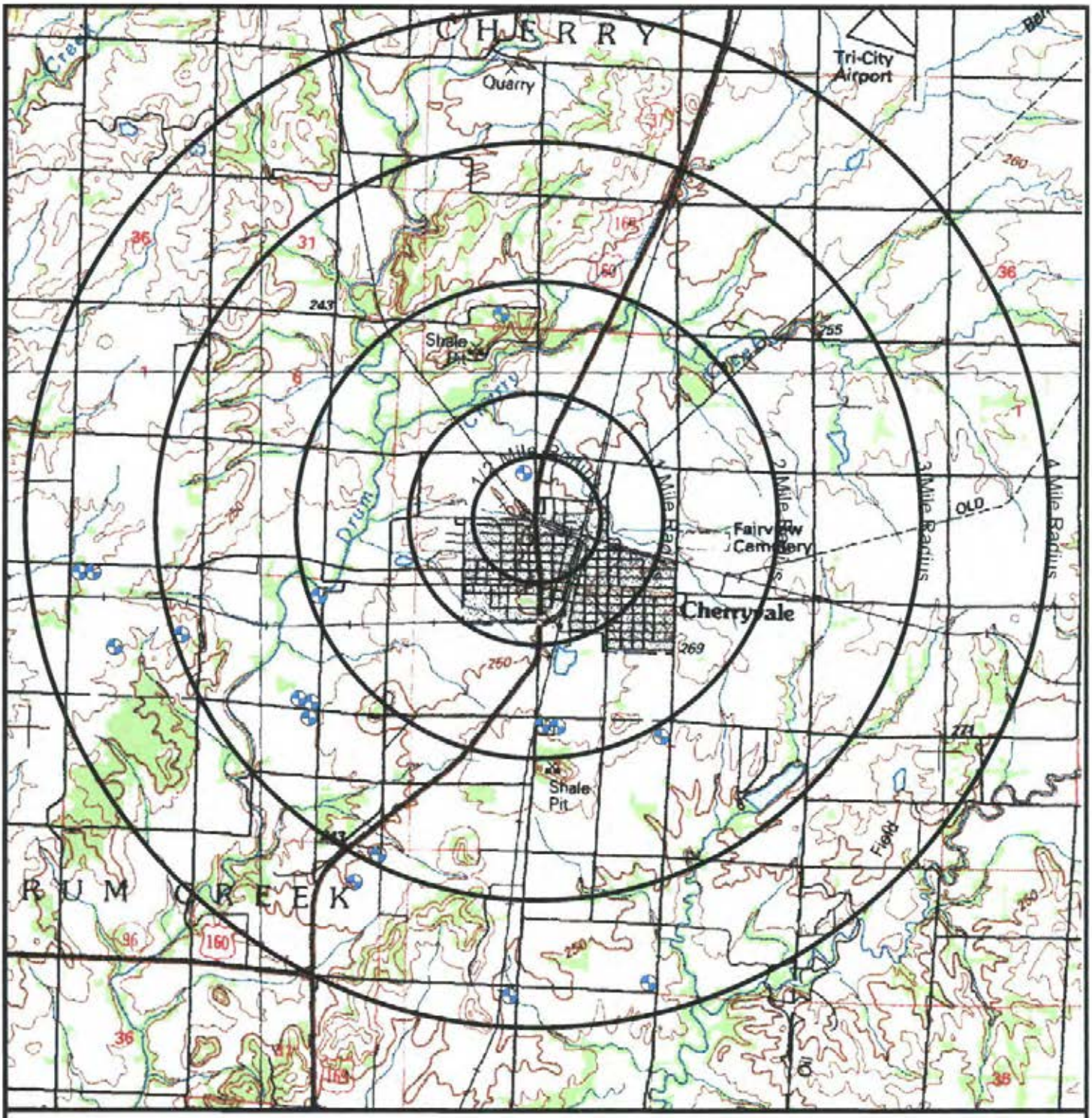


FIGURE 8
SURFACE WATER PATHWAY
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001



Domestic Well Location

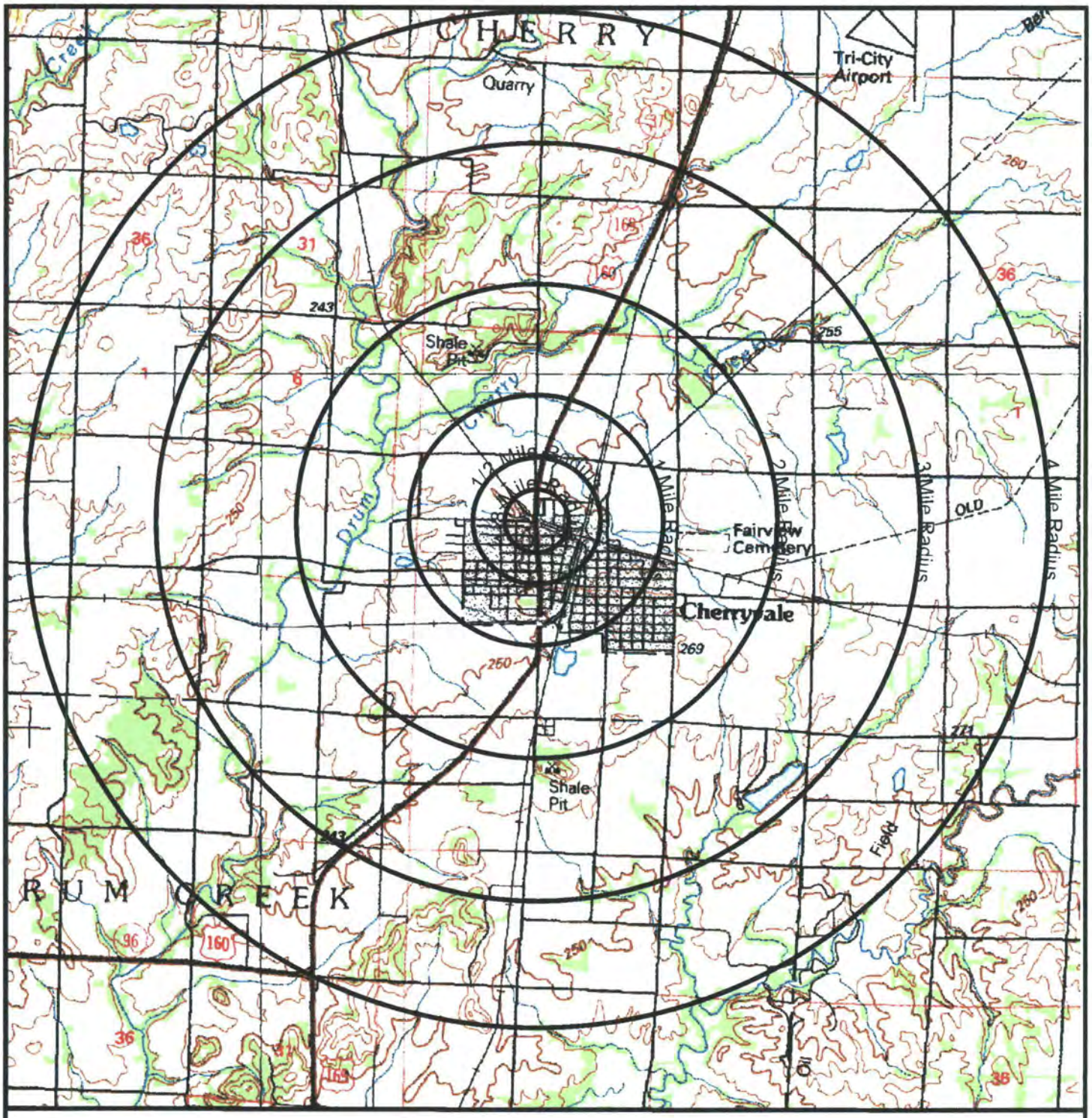
Population Data:
0-1/2 Mile Radius 1048
1/2-1 Mile Radius 1048
1 - 2 Mile Radius 725
2 - 3 Mile Radius 104
3 - 4 Mile Radius 207

FIGURE 9
DOMESTIC WELL LOCATIONS
GROUNDWATER PATHWAY MAP
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001

N
W E
S

Approximate Scale: 1 inch = 1.12 miles

Source: USGS Topographic Quadrangle Coffeyville, Kans., 1990. United States Census Tiger Data Files, 1990.



Population Data:
0-1/2 Mile Radius 1048
1/2-1 Mile Radius 1048
1 - 2 Mile Radius 725
2 - 3 Mile Radius 104
3 - 4 Mile Radius 207

FIGURE 10
SOIL AND AIR
PATHWAY MAP
National Zinc Site
Expanded Site Inspection
Cherryvale, Kansas
March, 2001

N
W E
S

Approximate Scale: 1 inch = 1.12 miles

Source: USGS Topographic Quadrangle Coffeyville, Kans., 1990. United States Census Tiger Data Files, 1990.

APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

Photo #1 - National Zinc ESI Site

Date: 3/01
View: Southwest
Photographer: Randolph L. Brown
Comments: Overview of Former National Zinc site.

Photo #2 - National Zinc ESI Site

Date: 3/01
View: Southwest
Photographer: Randolph L. Brown
Comments: Location of SW-U and SED-U (upstream surface water and sediment sampling location).

Photo #3 - National Zinc ESI Site

Date: 3/01
View: East
Photographer: Randolph L. Brown
Comments: SW-1/SED-1 attribution sample location and unnamed tributary of Drum Creek draining former National Zinc facility.

Photo #4 - National Zinc ESI Site

Date: 3/01
View: Southwest
Photographer: Randolph L. Brown
Comments: PPE and SW-2/SED-2 location is at background of photo.

Photo #5 - National Zinc ESI Site

Date: 3/01
View: North
Photographer: Randolph L. Brown
Comments: Drum Creek at SW-3/SED-3 sample location.

Photo #6 - National Zinc ESI Site

Date: 3/01
View: North
Photographer: Randolph L. Brown
Comments: Drum Creek, location of samples SW-4 and SED-4.

APPENDIX B

SURFACE WATER/SEDIMENT ANALYTICAL RESULTS

DIVISION OF HEALTH & ENVIRONMENTAL LABORATORIES

Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101274PT

4EM80
Site ID:
Account Code: EP

Collection Location: C306300026 Nat. Zinc SW-V

Collector: Randy Brown-BER
Matrix: Water
Collect Depth:
Date/Time Collected: 02/19/01 12:30
Date/Time Received: 02/22/01 11:21

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum		1.256	mg/L	02/26/01	EPA 200.7
Antimony	<	0.050	mg/L	02/26/01	EPA 200.7
Arsenic	<	0.050	mg/L	02/26/01	EPA 200.7
Barium		0.085	mg/L	02/26/01	EPA 200.7
Beryllium	<	0.001	mg/L	02/26/01	EPA 200.7
Boron	<	0.010	mg/L	02/26/01	EPA 200.7
Cadmium	<	0.005	mg/L	02/26/01	EPA 200.7
Calcium		63.10	mg/L	02/26/01	EPA 200.7
Chromium	<	0.010	mg/L	02/26/01	EPA 200.7
Cobalt	<	0.010	mg/L	02/26/01	EPA 200.7
Copper		0.023	mg/L	02/26/01	EPA 200.7
Iron		0.955	mg/L	02/26/01	EPA 200.7
Lead	<	0.050	mg/L	02/26/01	EPA 200.7
Magnesium		8.90	mg/L	02/26/01	EPA 200.7
Manganese		0.053	mg/L	02/26/01	EPA 200.7
Mercury	<	0.0005	mg/L	02/27/01	EPA 245.2
Molybdenum	<	0.020	mg/L	02/26/01	EPA 200.7
Nickel		0.006	mg/L	02/26/01	EPA 200.7
Potassium		3.20	mg/L	02/26/01	EPA 200.7
Selenium	<	0.050	mg/L	02/26/01	EPA 200.7
Silica		14.083	mg/L	02/26/01	EPA 200.7
Silver	<	0.010	mg/L	02/26/01	EPA 200.7
Sodium		19.29	mg/L	02/26/01	EPA 200.7
Thallium	<	0.050	mg/L	02/26/01	EPA 200.7
Vanadium	<	0.005	mg/L	02/26/01	EPA 200.7
Zinc		0.019	mg/L	02/26/01	EPA 200.7

Reporting Analyst: REH
Date Reported: 03/01/01

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101271PT

Site ID: 4EM80
Account Code: EP

Collection Location: Nat. Zinc SW-1

Collector: Randy Brown-BER
Date/Time Collected: 02/19/01 13:45

Matrix: Water

Collect Depth:
Date/Time Received: 02/22/01 11:07

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum	<	0.050	mg/L	02/26/01	EPA 200.7
Antimony	<	0.050	mg/L	02/26/01	EPA 200.7
Arsenic	<	0.050	mg/L	02/26/01	EPA 200.7
Barium		0.060	mg/L	02/26/01	EPA 200.7
Beryllium	<	0.001	mg/L	02/26/01	EPA 200.7
Boron		0.016	mg/L	02/26/01	EPA 200.7
Cadmium		0.082	mg/L	02/26/01	EPA 200.7
Calcium		150.59	mg/L	02/26/01	EPA 200.7
Chromium	<	0.010	mg/L	02/26/01	EPA 200.7
Cobalt	<	0.010	mg/L	02/26/01	EPA 200.7
Copper		0.014	mg/L	02/26/01	EPA 200.7
Iron		0.021	mg/L	02/26/01	EPA 200.7
Lead	<	0.050	mg/L	02/26/01	EPA 200.7
Magnesium		23.17	mg/L	02/26/01	EPA 200.7
Manganese		0.008	mg/L	02/26/01	EPA 200.7
Mercury	<	0.0005	mg/L	02/27/01	EPA 245.2
Molybdenum	<	0.020	mg/L	02/26/01	EPA 200.7
Nickel		0.010	mg/L	02/26/01	EPA 200.7
Potassium		5.15	mg/L	02/26/01	EPA 200.7
Selenium	<	0.050	mg/L	02/26/01	EPA 200.7
Silica		9.155	mg/L	02/26/01	EPA 200.7
Silver	<	0.010	mg/L	02/26/01	EPA 200.7
Sodium		77.51	mg/L	02/26/01	EPA 200.7
Thallium	<	0.050	mg/L	02/26/01	EPA 200.7
Vanadium	<	0.005	mg/L	02/26/01	EPA 200.7
Zinc		1.957	mg/L	02/26/01	EPA 200.7

Reporting Analyst: REH
Date Reported: 03/01/01

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101272PT

4EM80
Site ID:
Account Code: EP

Collection Location: C306300026 Nat. Zinc SW-2

Collector: Randy Brown-BER
Matrix: Water
Collect Depth:
Date/Time Collected: 02/19/01 13:30
Date/Time Received: 02/22/01 11:16

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum		0.142	mg/L	02/26/01	EPA 200.7
Antimony	<	0.050	mg/L	02/26/01	EPA 200.7
Arsenic	<	0.050	mg/L	02/26/01	EPA 200.7
Barium		0.077	mg/L	02/26/01	EPA 200.7
Beryllium	<	0.001	mg/L	02/26/01	EPA 200.7
Boron	<	0.010	mg/L	02/26/01	EPA 200.7
Cadmium		0.056	mg/L	02/26/01	EPA 200.7
Calcium		139.00	mg/L	02/26/01	EPA 200.7
Chromium	<	0.010	mg/L	02/26/01	EPA 200.7
Cobalt	<	0.010	mg/L	02/26/01	EPA 200.7
Copper		0.013	mg/L	02/26/01	EPA 200.7
Iron		0.103	mg/L	02/26/01	EPA 200.7
Lead	<	0.050	mg/L	02/26/01	EPA 200.7
Magnesium		20.88	mg/L	02/26/01	EPA 200.7
Manganese		0.017	mg/L	02/26/01	EPA 200.7
Mercury	<	0.0005	mg/L	02/27/01	EPA 245.2
Molybdenum	<	0.020	mg/L	02/26/01	EPA 200.7
Nickel		0.008	mg/L	02/26/01	EPA 200.7
Potassium		4.90	mg/L	02/26/01	EPA 200.7
Selenium	<	0.050	mg/L	02/26/01	EPA 200.7
Silica		9.018	mg/L	02/26/01	EPA 200.7
Silver	<	0.010	mg/L	02/26/01	EPA 200.7
Sodium		63.12	mg/L	02/26/01	EPA 200.7
Thallium	<	0.050	mg/L	02/26/01	EPA 200.7
Vanadium	<	0.005	mg/L	02/26/01	EPA 200.7
Zinc		1.256	mg/L	02/26/01	EPA 200.7

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Date Reported: 03/01/01

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Kansas Department of Health and Environment
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101273PT

4EM80
Site ID:
Account Code: EP

Collection Location: C306300026 Nat. Zinc SW-3

Collector: Randy Brown-BER
Matrix: Water
Collect Depth:
Date/Time Collected: 02/19/01 13:00
Date/Time Received: 02/22/01 11:19

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum		1.241	mg/L	02/26/01	EPA 200.7
Antimony	<	0.050	mg/L	02/26/01	EPA 200.7
Arsenic	<	0.050	mg/L	02/26/01	EPA 200.7
Barium		0.073	mg/L	02/26/01	EPA 200.7
Beryllium	<	0.001	mg/L	02/26/01	EPA 200.7
Boron	<	0.010	mg/L	02/26/01	EPA 200.7
Cadmium	<	0.005	mg/L	02/26/01	EPA 200.7
Calcium		62.11	mg/L	02/26/01	EPA 200.7
Chromium	<	0.010	mg/L	02/26/01	EPA 200.7
Cobalt	<	0.010	mg/L	02/26/01	EPA 200.7
Copper	<	0.010	mg/L	02/26/01	EPA 200.7
Iron		1.023	mg/L	02/26/01	EPA 200.7
Lead	<	0.050	mg/L	02/26/01	EPA 200.7
Magnesium		8.89	mg/L	02/26/01	EPA 200.7
Manganese		0.063	mg/L	02/26/01	EPA 200.7
Mercury	<	0.0005	mg/L	02/27/01	EPA 245.2
Molybdenum	<	0.020	mg/L	02/26/01	EPA 200.7
Nickel		0.009	mg/L	02/26/01	EPA 200.7
Potassium		3.33	mg/L	02/26/01	EPA 200.7
Selenium	<	0.050	mg/L	02/26/01	EPA 200.7
Silica		13.468	mg/L	02/26/01	EPA 200.7
Silver	<	0.010	mg/L	02/26/01	EPA 200.7
Sodium		20.19	mg/L	02/26/01	EPA 200.7
Thallium	<	0.050	mg/L	02/26/01	EPA 200.7
Vanadium	<	0.005	mg/L	02/26/01	EPA 200.7
Zinc		0.040	mg/L	02/26/01	EPA 200.7

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Kansas Department of Health and Environment
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101275PT

4EM80
Site ID:
Account Code: EP

Collection Location: C306300026 Nat. Zinc SW-4

Collector: Randy Brown-BER
Matrix: Water
Collect Depth:
Date/Time Collected: 02/19/01 14:00
Date/Time Received: 02/22/01 11:23

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum		1.544	mg/L	02/26/01	EPA 200.7
Antimony	<	0.050	mg/L	02/26/01	EPA 200.7
Arsenic	<	0.050	mg/L	02/26/01	EPA 200.7
Barium		0.083	mg/L	02/26/01	EPA 200.7
Beryllium	<	0.001	mg/L	02/26/01	EPA 200.7
Boron	<	0.010	mg/L	02/26/01	EPA 200.7
Cadmium	<	0.005	mg/L	02/26/01	EPA 200.7
Calcium		64.89	mg/L	02/26/01	EPA 200.7
Chromium	<	0.010	mg/L	02/26/01	EPA 200.7
Cobalt	<	0.010	mg/L	02/26/01	EPA 200.7
Copper	<	0.010	mg/L	02/26/01	EPA 200.7
Iron		1.192	mg/L	02/26/01	EPA 200.7
Lead	<	0.050	mg/L	02/26/01	EPA 200.7
Magnesium		9.47	mg/L	02/26/01	EPA 200.7
Manganese		0.079	mg/L	02/26/01	EPA 200.7
Mercury	<	0.0005	mg/L	02/27/01	EPA 245.2
Molybdenum	<	0.020	mg/L	02/26/01	EPA 200.7
Nickel		0.009	mg/L	02/26/01	EPA 200.7
Potassium		3.38	mg/L	02/26/01	EPA 200.7
Selenium	<	0.050	mg/L	02/26/01	EPA 200.7
Silica		15.232	mg/L	02/26/01	EPA 200.7
Silver	<	0.010	mg/L	02/26/01	EPA 200.7
Sodium		22.70	mg/L	02/26/01	EPA 200.7
Thallium	<	0.050	mg/L	02/26/01	EPA 200.7
Vanadium		0.009	mg/L	02/26/01	EPA 200.7
Zinc		0.069	mg/L	02/26/01	EPA 200.7

Reporting Analyst: REH
Date Reported: 03/01/01

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740

Topeka KS 66620

Lab Number: 101278PT

4EM80

Site ID:
Account Code: EP

Collection Location: C306300026 Nat. Zinc SED-1

Collector: Randy Brown
Date/Time Collected: 02/19/01 13:45

Matrix: Sediment/Sludge Collect Depth:
Date/Time Received: 02/21/01 17:00

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)		13261.62	mg/Kg	02/28/01	EPA 6010
Antimony (Total)	<	5.00	mg/Kg	02/28/01	EPA 6010
Arsenic (Total)		48.39	mg/Kg	02/28/01	EPA 6010
Barium (Total)		345.59	mg/Kg	02/28/01	EPA 6010
Beryllium (Total)		0.94	mg/Kg	02/28/01	EPA 6010
Boron (Total)	<	1.00	mg/Kg	02/28/01	EPA 6010
Cadmium (Total)		165.81	mg/Kg	02/28/01	EPA 6010
Calcium (Total)		5318.06	mg/Kg	02/28/01	EPA 6010
Chromium (Total)		26.58	mg/Kg	02/28/01	EPA 6010
Cobalt (Total)		34.45	mg/Kg	02/28/01	EPA 6010
Copper (Total)		1164.46	mg/Kg	02/28/01	EPA 6010
Iron (Total)		55633.83	mg/Kg	02/28/01	EPA 6010
Lead (Total)		1294.61	mg/Kg	02/28/01	EPA 6010
Magnesium (Total)		1160.01	mg/Kg	02/28/01	EPA 6010
Manganese (Total)		2942.08	mg/Kg	02/28/01	EPA 6010
Mercury		0.0876	mg/Kg	02/27/01	EPA 245.2
Molybdenum (Total)	<	2.00	mg/Kg	02/28/01	EPA 6210
Nickel (Total)		36.46	mg/Kg	02/28/01	EPA 6210
Potassium (Total)		1216.32	mg/Kg	02/28/01	EPA 6210
Selenium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Silica (Total)		78.24	mg/Kg	02/28/01	EPA 6210
Silver (Total)		2.30	mg/Kg	02/28/01	EPA 6210
Sodium (Total)		228.50	mg/Kg	02/28/01	EPA 6210
Thallium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Vanadium (Total)		64.32	mg/Kg	02/28/01	EPA 6210
Zinc (Total)		9877.32	mg/Kg	02/28/01	EPA 6210

Reporting Analyst: REH
Date Reported: 03/05/01

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740

Topeka KS 66620

Lab Number: 101279PT

Site ID: 4EM80
Account Code: EP

Collection Location: C306300026 Nat. Zinc SED-2

Collector: Randy Brown
Date/Time Collected: 02/19/01 13:30

Matrix: Sediment/Sludge Collect Depth:
Date/Time Received: 02/21/01 17:00

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)		12099.65	mg/Kg	02/28/01	EPA 6010
Antimony (Total)	<	5.00	mg/Kg	02/28/01	EPA 6010
Arsenic (Total)		16.63	mg/Kg	02/28/01	EPA 6010
Barium (Total)		81.09	mg/Kg	02/28/01	EPA 6010
Beryllium (Total)		0.51	mg/Kg	02/28/01	EPA 6010
Boron (Total)	<	1.00	mg/Kg	02/28/01	EPA 6010
Cadmium (Total)		160.42	mg/Kg	02/28/01	EPA 6010
Calcium (Total)		26143.34	mg/Kg	02/28/01	EPA 6010
Chromium (Total)		16.33	mg/Kg	02/28/01	EPA 6010
Cobalt (Total)		9.44	mg/Kg	02/28/01	EPA 6010
Copper (Total)		429.92	mg/Kg	02/28/01	EPA 6010
Iron (Total)		19647.65	mg/Kg	02/28/01	EPA 6010
Lead (Total)		189.64	mg/Kg	02/28/01	EPA 6010
Magnesium (Total)		1566.53	mg/Kg	02/28/01	EPA 6010
Manganese (Total)		431.82	mg/Kg	02/28/01	EPA 6010
Mercury		0.0319	mg/Kg	02/27/01	EPA 245.2
Molybdenum (Total)	<	2.00	mg/Kg	02/28/01	EPA 6210
Nickel (Total)		23.82	mg/Kg	02/28/01	EPA 6210
Potassium (Total)		1683.35	mg/Kg	02/28/01	EPA 6210
Selenium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Silica (Total)		104.22	mg/Kg	02/28/01	EPA 6210
Silver (Total)	<	1.00	mg/Kg	02/28/01	EPA 6210
Sodium (Total)		145.83	mg/Kg	02/28/01	EPA 6210
Thallium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Vanadium (Total)		28.78	mg/Kg	02/28/01	EPA 6210
Zinc (Total)		4377.07	mg/Kg	02/28/01	EPA 6210

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740

Topeka KS 66620

Lab Number: 101280PT

Site ID: 4EM80
Account Code: EP

Collection Location: C306300026 Nat. Zinc SED-3

Collector: Randy Brown
Date/Time Collected: 02/19/01 13:00

Matrix: Sediment/Sludge Collect Depth:
Date/Time Received: 02/21/01 17:00

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)		10053.46	mg/Kg	02/28/01	EPA 6010
Antimony (Total)	<	5.00	mg/Kg	02/28/01	EPA 6010
Arsenic (Total)	<	5.00	mg/Kg	02/28/01	EPA 6010
Barium (Total)		86.98	mg/Kg	02/28/01	EPA 6010
Beryllium (Total)		0.42	mg/Kg	02/28/01	EPA 6010
Boron (Total)	<	1.00	mg/Kg	02/28/01	EPA 6010
Cadmium (Total)		4.02	mg/Kg	02/28/01	EPA 6010
Calcium (Total)		2351.47	mg/Kg	02/28/01	EPA 6010
Chromium (Total)		12.61	mg/Kg	02/28/01	EPA 6010
Cobalt (Total)		5.17	mg/Kg	02/28/01	EPA 6010
Copper (Total)		33.56	mg/Kg	02/28/01	EPA 6010
Iron (Total)		11846.39	mg/Kg	02/28/01	EPA 6010
Lead (Total)		24.29	mg/Kg	02/28/01	EPA 6010
Magnesium (Total)		1162.12	mg/Kg	02/28/01	EPA 6010
Manganese (Total)		341.35	mg/Kg	02/28/01	EPA 6010
Mercury		0.0072	mg/Kg	02/27/01	EPA 245.2
Molybdenum (Total)	<	2.00	mg/Kg	02/28/01	EPA 6210
Nickel (Total)		12.06	mg/Kg	02/28/01	EPA 6210
Potassium (Total)		1316.38	mg/Kg	02/28/01	EPA 6210
Selenium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Silica (Total)		130.61	mg/Kg	02/28/01	EPA 6210
Silver (Total)	<	1.00	mg/Kg	02/28/01	EPA 6210
Sodium (Total)		73.55	mg/Kg	02/28/01	EPA 6210
Thallium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Vanadium (Total)		17.76	mg/Kg	02/28/01	EPA 6210
Zinc (Total)		306.16	mg/Kg	02/28/01	EPA 6210

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740

Topeka KS 66620

Lab Number: 101281PT

Site ID: 4EM80
Account Code: EP

Collection Location: C306300026 Nat. Zinc SED-4

Collector: Randy Brown
Date/Time Collected: 02/19/01 14:00

Matrix: Sediment/Sludge Collect Depth:
Date/Time Received: 02/21/01 17:00

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)		10818.54	mg/Kg	02/28/01	EPA 6010
Antimony (Total)	<	5.00	mg/Kg	02/28/01	EPA 6010
Arsenic (Total)		29.69	mg/Kg	02/28/01	EPA 6010
Barium (Total)		143.29	mg/Kg	02/28/01	EPA 6010
Beryllium (Total)		1.07	mg/Kg	02/28/01	EPA 6010
Boron (Total)	<	1.00	mg/Kg	02/28/01	EPA 6010
Cadmium (Total)		6.74	mg/Kg	02/28/01	EPA 6010
Calcium (Total)		15460.83	mg/Kg	02/28/01	EPA 6010
Chromium (Total)		23.07	mg/Kg	02/28/01	EPA 6010
Cobalt (Total)		21.25	mg/Kg	02/28/01	EPA 6010
Copper (Total)		76.81	mg/Kg	02/28/01	EPA 6010
Iron (Total)		57296.15	mg/Kg	02/28/01	EPA 6010
Lead (Total)		56.60	mg/Kg	02/28/01	EPA 6010
Magnesium (Total)		1486.22	mg/Kg	02/28/01	EPA 6010
Manganese (Total)		1121.28	mg/Kg	02/28/01	EPA 6010
Mercury		0.0205	mg/Kg	02/27/01	EPA 245.2
Molybdenum (Total)	<	2.00	mg/Kg	02/28/01	EPA 6210
Nickel (Total)		37.92	mg/Kg	02/28/01	EPA 6210
Potassium (Total)		1680.41	mg/Kg	02/28/01	EPA 6210
Selenium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Silica (Total)		104.38	mg/Kg	02/28/01	EPA 6210
Silver (Total)	<	1.00	mg/Kg	02/28/01	EPA 6210
Sodium (Total)		263.05	mg/Kg	02/28/01	EPA 6210
Thallium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Vanadium (Total)		56.16	mg/Kg	02/28/01	EPA 6210
Zinc (Total)		517.02	mg/Kg	02/28/01	EPA 6210

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Kansas Department of Health and Environment
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101282PT

Site ID: 4EM80
Account Code: EP

Collection Location: C306300026 Nat. Zinc SED-V

Collector: Randy Brown-BER
Date/Time Collected: 02/19/01 12:30

Matrix: Sediment/Sludge
Collect Depth:
Date/Time Received: 02/21/01 17:00

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)		10674.20	mg/Kg	02/28/01	EPA 6010
Antimony (Total)	<	5.00	mg/Kg	02/28/01	EPA 6010
Arsenic (Total)		27.79	mg/Kg	02/28/01	EPA 6010
Barium (Total)		329.59	mg/Kg	02/28/01	EPA 6010
Beryllium (Total)		1.42	mg/Kg	02/28/01	EPA 6010
Boron (Total)	<	1.00	mg/Kg	02/28/01	EPA 6010
Cadmium (Total)		3.76	mg/Kg	02/28/01	EPA 6010
Calcium (Total)		3302.77	mg/Kg	02/28/01	EPA 6010
Chromium (Total)		17.91	mg/Kg	02/28/01	EPA 6010
Cobalt (Total)		23.13	mg/Kg	02/28/01	EPA 6010
Copper (Total)		27.49	mg/Kg	02/28/01	EPA 6010
Iron (Total)		76684.59	mg/Kg	02/28/01	EPA 6010
Lead (Total)		36.11	mg/Kg	02/28/01	EPA 6010
Magnesium (Total)		1785.67	mg/Kg	02/28/01	EPA 6010
Manganese (Total)		2255.43	mg/Kg	02/28/01	EPA 6010
Mercury		0.0099	mg/Kg	02/27/01	EPA 245.2
Molybdenum (Total)	<	2.00	mg/Kg	02/28/01	EPA 6210
Nickel (Total)		49.48	mg/Kg	02/28/01	EPA 6210
Potassium (Total)		1260.47	mg/Kg	02/28/01	EPA 6210
Selenium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Silica (Total)		99.98	mg/Kg	02/28/01	EPA 6210
Silver (Total)	<	1.00	mg/Kg	02/28/01	EPA 6210
Sodium (Total)		112.16	mg/Kg	02/28/01	EPA 6210
Thallium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Vanadium (Total)		41.34	mg/Kg	02/28/01	EPA 6210
Zinc (Total)		92.37	mg/Kg	02/28/01	EPA 6210

Reporting Analyst: REH
Date Reported: 03/05/01

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APPENDIX C

CHERRYVALE RESIDENTIAL YARDS REMOVAL SITE EVALUATION (RSE)

REMOVAL SITE EVALUATION (RSE) FOR THE CHERRYVALE RESIDENTIAL YARDS SITE, CHERRYVALE, MONTGOMERY COUNTY, KANSAS
KDHE I.D. C306371097

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT (KDHE)
BUREAU OF ENVIRONMENTAL REMEDIATION (BER)
REMEDIAL SECTION, SITE ASSESSMENT UNIT
FORBES FIELD
BUILDING 740
TOPEKA, KANSAS 66620

REMOVAL SITE EVALUATION (RSE) FOR THE CHERRYVALE RESIDENTIAL YARDS SITE, CHERRYVALE, MONTGOMERY COUNTY, KANSAS KDHE I.D. C306371097

MARCH, 2001

SITE RECONNAISSANCE AND FIELD WORK BY:

Randolph L. Brown, Environmental Geologist, Project Manager and Radiation Safety Officer
Peter Haxton, Environmental Technician and Health and Safety Officer
Travis Kogl, Quality Assurance Officer

Removal Site Evaluation
Cherryvale Residential Yards Site
Cherryvale, Kansas
March 2001
KDHE/BER PROJECT #C306371097

KDHE/BER Project Manager:
Randolph L. Brown, Environmental Geologist, Site Assessment Unit

CHERRYVALE RESIDENTIAL YARDS SITE
REMOVAL SITE EVALUATION (RSE)
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SECTION 1.0: INTRODUCTION

1.1 Purpose

This Removal Site Evaluation (RSE) was performed under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and consistent with the National Oil and Hazardous Substances Contingency Plan (NCP) 40 CFR § 300. The RSE was performed by the KDHE Bureau of Environmental Remediation (BER) as part of the cooperative agreement with EPA to conduct integrated assessment activities for the federal Fiscal Year (FY) 2000. The purpose of this RSE is to evaluate residential yards for the presence of heavy metal contaminants directly adjacent to the National Zinc site and to identify potential conditions eligible for removal response and/or further removal site evaluation consistent with §§ 300.410-300.415 of the NCP in these areas.

The RSE gathered additional information to support consideration of removal response actions consistent with § 300.300-310 and § 300.410-300.415 of the NCP. The RSE investigation included a site visit and sampling of private yards directly adjacent to the National Zinc site in Cherryvale, Montgomery County, Kansas. The National Zinc site has the EPA identification number (CERCLIS) of **KSD980406698**.

1.2 Site Description

The RSE sampling area included the residential yards within a two-(2) block area at the southern edge of the National Zinc site. The Brownfields Targeted Assessment (BTA) did not determine the full extent of lead, cadmium and zinc contamination of surficial soils at the southern edge of the National Zinc site. The primary purpose of this RSE was thus intended therefore to conduct an initial screening of the residential yards in this area, namely Front and Martin Streets bounded by Coyle and School Streets on the east and west, respectively. The National Zinc site is located at the northwestern city limits of Cherryvale, Montgomery County, Kansas (see Figure 1) and is located along U.S. Highway 169. Cherryvale is a rural community with some light industry. The population of Cherryvale as of the last census was 2,464 persons (Reference 8). The geographic coordinates of the site are 39° 42' 30.0" North latitude and 96° 25' 00" West longitude. The site is located in Section 8 in Township 32 South, Range 17 East (Reference 1). Figure 2 illustrates the site location from aerial photographs.

1.3 Site History

The National Zinc site consists of approximately 350 acres containing the former National Zinc smelter facility on the northern edge of Cherryvale, Kansas. Historical review from Sanborn Fire Insurance maps and historical archive information available during the BTA indicates that the Edgar Zinc Company began construction of a primary lead and zinc smelter at the site in 1898. The facility initially was

constructed with 1,800 retorts and 3 furnace buildings. By 1908 the smelter facility had 4,800 retorts and 24 furnaces. The 1928 Sanborn Map (the most recent available) also indicates the facility had four (4) massive ore roasters and 24 furnaces in operation, consistent with the 1908 configuration.

The Sanborn Maps indicate the facility as operating "day and night". This facility was recognized as the largest zinc smelter in the world until World War I. Nearly 500 employees worked at this facility at its peak, and the population of Cherryvale was nearly 8,000 during the early 1900s at the peak of the Edgar Zinc facility production. The Edgar Zinc facility was by far the largest employer and industrial facility in Cherryvale during its operational life. The location of the Frisco Railroad line at the eastern edge of the site in addition to plentiful shallow natural gas from oil and gas production in the local area provided the necessary transportation and energy resources for the operation of the Edgar Zinc facility. At least one half of the demand for primary zinc production was for galvanizing purposes. U.S. Steel Corporation may also have had some ownership interest in the Edgar Zinc Company around 1910. The facility operated as the Edgar Zinc Company until sometime after 1928, when it was reorganized as the National Zinc Company (References 6, 28, 29). Production appears to have declined through the 1930s when most active operations ceased.

Sludges and liquid wastes contaminated with heavy metals were contained in large settling ponds covering approximately 23 acres. The lagoons were used to contain runoff from an estimated 2,000 tons of slag and roasted ore. The National Zinc smelter facility permanently terminated operations on December 24, 1976. Presently, the site contains the encapsulated former lagoon, several abandoned buildings and building foundations, and the remains of the smelter operations.

Incidents of surface water contamination in the 1950s were reported to KDHE by adjacent property owners when contaminated water breached the large pond. On April 1976, the site was investigated by KDHE following complaints from farmers regarding visual surface water contamination in Drum Creek and concern over the possibility of a fish kill or cattle illness from surface water consumption. KDHE personnel also inspected the site on September 27, 1977 for possible surface water or ground water pollution associated with facility run-off and seeps. At the request of KDHE, limited response actions were initiated at the site by the National Zinc Company in October, 1977. Beginning in 1979, approximately 95 million gallons of fluid from the lagoon was treated and discharged into the adjacent Drum Creek. Ore and sludge was removed from the site; some of the remaining sludge (approximately 300 tons) was encapsulated on site. The lagoon was filled with dirt and top soil, treated with lime, and planted with grass. Five monitoring wells were installed in the western and southern edges of the large pond. Analytical results of ground water samples collected in 1982-1984 indicated high levels of cadmium and lead. A restrictive covenant limiting use or development of the property was prepared in 1983 and still governs the site.

In addition, KDHE inspected the site in May 1995 following a City of Cherryvale inquiry into possible restrictive covenant termination and redevelopment of the property. Surface water, soil, sediment, and

sludge/waste samples were obtained by KDHE personnel. Shallow ground water samples were also collected from existing monitoring wells installed around the lagoon. Laboratory analysis revealed contamination of sludge, soil and sediment samples of selected Resource Conservation and Recovery Act (RCRA) heavy metals above the non-residential Risk-Based Standards for Kansas (RSKs). Lead was detected at a maximum of 176,750 mg/kg (RSK = 1,000 mg/kg), cadmium at 2,816 mg/kg (RSK = 1,000 mg/kg), and arsenic at a maximum of 240 mg/kg (RSK = 38 mg/kg). Cadmium was detected in surface and ground water up to 0.111 mg/l, above its maximum contaminant level (MCL) of 0.005 mg/l. In July, 1996, sediment/sludge sampling indicated lead up to 1,786 mg/kg, above its non-residential RSK level of 1,000 mg/kg and cadmium in surface water up to 0.347 mg/l on-site in standing water. Preliminary Assessment (PA) and Site Inspection forms were completed by KDHE in 1981 and the site was assigned the CERCLA Identification System (CERCLIS) identification number KSD980406698. The PA/SI forms are included in Appendix L. The site is currently also in KDHE's Enforcement/Negotiation program to gather and review information pertaining to potential responsible parties (PRPs) for the National Zinc site.

The residential areas evaluated for the RSE were not part of the Edgar Zinc works and facility itself. According to historical Sanborn maps this area contained residential areas, the Edgar Chapel, the Cherryvale Butter and Cheese Factory and a hay and feed warehouse/store. Directly across Martin street to the north from the residential area was an ore store house, pattern storage and a "chemical laboratory" most likely performing assays on ore samples, (see Attachment F) which was part of the Edgar Zinc/National Zinc facility and was owned by National Zinc. From a review of available property ownership information, National Zinc owned the land immediately north of the residential area (National Zinc 'Tract 4") but did not appear to own the land now containing the residential area.

1.4 Previous Investigations

KDHE conducted extensive sampling of the National Zinc site during the Brownfields Targeted Assessment (BTA) Report. The BTA identified several data gaps in the surficial soil sampling, the largest being the area bounded by the residential properties evaluated for this RSE. The BTA Report was completed by KDHE in 1999 and approved by EPA in April, 2000. Approximately 659 *in-situ* X-ray fluorescence (XRF) soil analysis were conducted at the site during the 1999 BTA (this number does not include standards/calibration or other QC analyses). Of these, approximately 141 samples were submitted for laboratory analysis. Subsurface waste profile samples, surface water, sediment and ground water samples were also obtained at the site. Surface soil XRF detections ranged from non-detect through much of the northeastern and southwestern portions of the site to a maximum of 35,700 parts per million (ppm or mg/kg) lead at location N 6200 E 6700. Cadmium was not detected in excess of its 1,000 mg/kg non-residential RSK value, although it was detected above its residential RSK level of 39 mg/kg across nearly all of the areas also indicating elevated lead levels. Arsenic also exceeded its non-residential RSK value of 86 mg/kg, at a maximum concentration of 306 mg/kg.

SECTION 2.0: SITE GEOLOGY AND SOILS

2.1 Soils

The undisturbed areas of the site (primarily in the northeast half of the site) are typically underlain by the Kenoma series soils. The Kenoma soils are generally deep, moderately well drained, very slowly permeable soils on uplands, of 0 to 2 percent slopes. The surface layer (A horizon) typically consists of a dark grayish brown silt loam about 6-12 inches thick. The upper portion of the subsoil layer (B horizon) is typically 9 inches thick and consists of very dark grayish brown to grayish brown silty clay. The lower portion of the subsoil layer is typically 40 inches thick and consists of dark yellowish brown to dark brown to reddish brown silty clay. Typical depth of Kenoma soils averages 60 inches or greater. The southern edge of the site is also within the Dennis series, but the native soil profile for this series is very similar to the Kenoma series. No C horizon is recognized because of the generally deep (60 inches) thickness of these soil types.

The unified soil classification of the A horizon is CL to CL-ML to ML (18-29 % clay) with a plasticity index range of 3-18 and a liquid limit range of 24-40. The unified soil classification of the B horizon is CH (40-60 % clay) with a plasticity index range of 30-48 and a liquid limit range of 50-75. Available water content is high (0.10-0.24). Surface runoff is slow (0.2-0.06 in/hr) and shrink-swell potential is high, especially below 12 inches. Permeability generally ranges from 0.2 to 0.6 inches/hour (Reference 3).

2.2 Geology

The site is located in a broad, low-relief upland of the Osage Questas physiographic area of southeast Kansas. Bedrock of Pennsylvanian age is present at the base of the soil profile. During the installation of temporary monitoring wells during at the National Zinc BTA, bedrock was typically encountered between 14 feet (TW-1) and 3.5 feet (TW-8).

The bedrock units underlying the site are believed to be composed of sandstone and limestone of the Cherryvale Shale and Dennis Limestone Formations of the Kansas City Group. A yellowish to reddish-brown sandstone was typically encountered as the bedrock layer upon auger refusal. Ground water occurrence within the Cherryvale Shale and Dennis Formations is typically localized with very low (less than 3 gallons per minute) yields of generally poor quality. These bedrock units typically yield little to no water except in the shallow weathered zone near the upper bedrock surface. Oil field intrusion of brines in the site area from oil production fating back to the early 1900s has impacted shallow ground water quality regionally in this portion of Southeast Kansas (Reference 4).

Ground water occurrence in the site area is primarily restricted to unconsolidated alluvial deposits of the Verdigris River and Cherry Creek. The City of Cherryvale receives water from a surface intake on Big

Hill Lake located approximately five (5) miles east of Cherryvale. Significant karst terrain does not exist in the site area given the sequential shale-sandstone-limestone stratigraphy of the bedrock units. The City of Cherryvale and Montgomery County Rural Water District # 12 supplies water to private residences surrounding the site.

2.3 Site Hydrology and Surface Water Pathway

Drainage from the site is to the unnamed tributary which converges with the drainage from the National Zinc site approximately 500 feet north of Martin Street at the western end of the Cherryvale Yards site to the north of the former Cherryvale Rodeo Grounds. This unnamed tributary converges with Drum Creek approximately 3/4 mile to the west of U.S. 169 highway. The surface water pathway with regards to the National Zinc site will be discussed in greater detail in the National Zinc ESI Report.

SECTION 3.0: RSE FIELD ACTIVITIES

The Phase II RSE field activities included: (1) a site visit, (2) collection of four (4) background soil samples to determine a statistical background mean, and (3) sampling of residential yards immediately adjacent to the National Zinc site in the area of concern. KDHE's Niton 733 X-ray fluorescence unit (XRF) was utilized to field analyze surficial soil and subsurface soil boring samples. A site-specific Quality Assurance Project Plan (QAPP) was developed and followed for the RSE activities.

3.1 Background Sampling

Background samples were obtained at four (4) locations during the RSE. These were in locations either up- or side-wind of the former National Zinc site, topographically uphill and located in similar soil types. One sample was obtained from roughly the center of the Cherryvale City Park. Another sample was obtained approximately 50 feet northeast of the intersection of Roads 5200 and 5700 (Olive Street), another at the eastern edge of the city cemetery, and one approximately 50 feet southeast of the intersection of Carson Road and Grand Avenue. Samples were obtained with clean steel trowels from 0-6" and placed directly into prepared 4-oz glass jars. Laboratory analysis alone was performed to determine a definitive level for background range and thus XRF analysis was not performed on the background samples. Background samples were submitted to the KDHE's Division of Health and Environment Laboratory (DHEL) for RCRA metals analysis by EPA Methods 6010 and 7471 (mercury).

3.2 Residential Yard Sampling

Eleven (11) residential yards were evaluated during the RSE. Samples were obtained by removing soil from 0-6" below ground surface at each sample location with a clean steel trowel and placing the sample

in a marked 1 quart zip-lock freezer bag. Samples were analyzed in the field with KDHE's Niton Model 733 X-ray fluorescence (XRF) analyzer using the ^{109}Cd sealed radioactive source. A split laboratory sample was also obtained and placed in a 4-oz. prepared glass laboratory jar. Since cadmium or other constituents were not detected using the sealed ^{241}Am source with interference from elevated lead levels, use of the ^{241}Am source was discontinued early in the RSE field work. Laboratory samples were submitted to compare low, medium and higher XRF lead detections by EPA Method 6200 with laboratory results analyzed by EPA Method 6010. Bagged samples were also analyzed by XRF after a minimum of four (4) hours drying period in KDHE's laboratory soil sample drying oven at 60-80° C. All bagged XRF samples were analyzed by analyzing three (3) discrete locations across the bag and calculating a linear average between the three separate analyses per bag. The analysis time was reduced to 30 source seconds (Ss) early in the RSE as the difference in precision and accuracy from a 60 Ss analysis was not determined to be significant. A total of 54 wet and 57 dried samples were analyzed by XRF. A total of 170 separate analyses were performed on wet samples and 180 analyses were performed on dried samples (including field duplicates).

Trowels were decontaminated after each use by soaking in a deionized water and alcanox detergent solution, triple rinsing with deionized water and then drying with disposable paper towels prior to re-use. One rinsate sample was obtained from decontamination of sampling equipment during the RSE. The rinsate sample was submitted to DHEL for RCRA metals analysis. Laboratory samples were submitted to Continental Analytical Services (CAS) laboratory in Salina, Kansas for analysis by EPA Method 6010 (except mercury) and EPA Method 7471 (mercury). Toxicity Characteristic Leachate Procedure (TCLP) was also performed on selected laboratory samples, including the maximum detections. Laboratory samples were refrigerated until XRF analysis was completed and appropriate representative laboratory confirmation samples selected. A total of 19 laboratory samples were analyzed for a confirmatory rate of 33 % for both dried and undried (wet) samples.

SECTION 4.0: ANALYTICAL RESULTS

4.1 Background Sample Results

Background sample results are included in table form in Attachment A. A three times (3X) background concentration was calculated by determining the mean concentration of all of the background samples for the constituents detected. Lead, arsenic, and cadmium appear to be the primary constituents of concern at the site. The table also lists the 3X background maximum (3XMAX) concentration by multiplying the highest concentration for each constituent amongst the four (4) background samples by a factor of three (3). The lead 3X mean concentration was calculated to be 130.1 mg/kg, and the lead 3XMAX concentration was calculated to be approximately 627 mg/kg. The cadmium 3X mean concentration was calculated to be 2.6 mg/kg, and the 3XMAX concentration was calculated to be 16.6

mg/kg. The arsenic 3X mean concentration was calculated to be 6.7 mg/kg, and the 3XMAX concentration was calculated to be 24.0 mg/kg.

4.2 Residential Yard Sample Results

Every residential yard sampled during the RSE indicated lead levels in excess of KDHE's Risk-Based Levels for Kansas (RSKs) of 400 mg/kg for lead. A four-point (four discrete locations) background sampling strategy was utilized to determine mean background concentrations for lead, cadmium, chromium and mercury. Background sample locations are included in Figure 3.

XRF sample results are included in Figure 2, and laboratory sample results are included in Figure 3. The following residences indicated lead above 400 mg/kg in residential yard samples: 511 and 619 Martin, 509, 513, 520, 524, 610, 617, 618, 620, and 621 Front Street. 11 residential yards sampled during the RSE were identified with lead contamination in excess of the KDHE residential RSK level of 400 mg/kg. The maximum laboratory detection for lead was 3,680 mg/kg at 618 Front # 2. The maximum XRF detection for lead (dried) was 2,760 at 618 Front # 1 (laboratory value of 3,190 mg/kg). The 3XMAX lead concentration of 627 mg/kg was also exceeded in at least one sample in each of these yards. Samples obtained along the south side of Front Street also indicate that residential areas to the south of Front Street may also have lead levels in excess of 400 mg/kg. The full extent of impacted yards to the source of the site was not identified during this RSE. A Phase II RSE is recommended to further assess residential yards south to West First Street between Catherine and Coyle Streets to better define the area of impacted yards.

Cadmium was detected above its residential RSK of 39 mg/kg at 619 Martin # 5 (180 mg/kg), 618 Front #1 (41 mg/kg), 618 Front #2 (121 mg/kg) and in the alley south of Martin (Martin Alley #2) at 40.8 mg/kg. These cadmium levels are also in excess of the 3X MAX concentration of 16.2 mg/kg. The 3XMAX concentration for arsenic was calculated to be 24 mg/kg. Four (4) samples indicated levels above 3XMAX, 618 Front #1 (31.3 mg/kg), 618 Front #2 (33.7 mg/kg), 618 Front # 1 (26.8 mg/kg) and Martin Alley # 2 (31.4 mg/kg). Mercury was detected above its 3XMAX level of 0.3 mg/kg in several samples but was not detected at or above its residential RSK level of 2 mg/kg. The data collected for the RSE indicates that elevated levels of cadmium and arsenic are only present above residential RSKs and 3XMAX concentrations coincident with lead levels identified in excess of 1,000 mg/kg.

Toxicity Characteristic Leachate Procedure (TCLP) was performed on eight (8) samples for lead by EPA Method 1311. The maximum value detected was 4.97 mg/l on sample 610 Front #1, which is below the 5.0 mg/l TCLP threshold for lead established in § 261.24 of RCRA. This was also the only sample in excess of 3.0 mg/l TCLP lead in all of the TCLP samples. The soil would not likely be a RCRA characteristic hazardous waste (D008) when bulked and a composite sample obtained.

4.3 Data Validation and Quality Control (QC) Sample Results

A linear regression was calculated for the XRF vs. laboratory lead data obtained at the Cherryvale Residential Yards site. Both wet and dried samples were compared with the laboratory results. A coefficient of correlation of $r^2 = 0.971$ was calculated for wet samples and a value of $r^2 = 0.924$ was calculated for dried samples. According to EPA Method 6200, a coefficient of correlation of $r^2 = 0.9$ or higher can be considered ***quantitative definitive level data***. A coefficient of correlation of $r^2 = 0.7$ to $r^2 = 0.9$ can be considered ***quantitative screening level data***. The coefficient of correlation for lead calculated for the Cherryvale Residential Yards site indicates that the XRF data obtained from the XRF analysis of bagged surficial soil samples (both in-field and later dried) during the RSE can be considered as approaching definitive level data since the coefficient of correlation is above 0.9.

A total of 13 field duplicates (5 wet and 8 dried) were analyzed with the Niton XRF unit during the RSE. The average relative standard deviation (RSD) was calculated to be 2.59 % for all field duplicate analyses during the RSE. The average RSD for all duplicate field analyses was well within the EPA Method 6200 20 % RSD acceptable value. The maximum RSD calculated was only 5.0 %. The percent difference (PD) between the National Institute of Standards and Testing (NIST) certified lead standards used during the RSE Niton XRF analyzed value indicated a maximum PD of 14.29 % and an average PD of 9.29 %. The acceptable PD proposed by EPA Method 6200 is also 20 %, and therefore all of the PD values measured as well as the average PD value during the RSE are within EPA Method 6200 acceptance criteria. A total of 22 NIST standards were also analyzed during the RSE. Since the inferential statistics for RSD and PD are within acceptance criteria for EPA Method 6200, all XRF data obtained during the Cherryvale Residential Yards RSE is accepted at 100 % completeness (Reference 12). No significant instrument or sampling QC problems were therefore identified during the RSE.

Laboratory data was validated consistent with KDHE's Quality Management Plan (QMP) by a member of the Site Assessment Unit of KDHE/BER who had no direct involvement with the acquisition of data for this project. Laboratory data was determined to be acceptable at 100 % completeness. A rinsate sample was collected during decontamination of steel trowels and submitted to the Division of Health and Environment Laboratories (DHEL) for analysis as an in-field QC sample. Lead, cadmium, and arsenic were not detected in the rinsate sample. Therefore no serious impact from cross-contamination of sampling equipment or compromise of QC parameters was identified from the RSE data.

SECTION 5.0: TARGETS AND IDENTIFIED SITE RISKS

The following residences indicated lead above 400 mg/kg in residential yard samples: 511 and 619 Martin, 509, 513, 520, 524, 610, 617, 618, 620, and 621 Front Street. 11 residential yards sampled during the RSE were identified with lead contamination in excess of the KDHE residential RSK level of

400 mg/kg. Using the 1990 census value of 2.42 persons per occupied husehold/housing unit, a value of 27 persons is calculated in excess of KDHE's residential RSK level for lead. Cadmium and arsenic were also detected above respective residential RSKs, but only in samples with coincident lead levels of 1,000+ mg/kg. Several of the residences were observed to have children either living at the residence or visiting daily. The full extent of impacted yards to the source of the site was not identified during this RSE. A Phase II RSE is recommended to further assess residential yards south to West First Street between Catherine and Coyle Streets to better define the area of impacted yards. Since the site is a residential area, access is not limited to impacted yard areas.

SECTION 6.0: RSE SUMMARY AND CONCLUSIONS

6.1 Summary

The RSE field activities included: (1) a site visit; (2) collection of background samples, and (3) sampling of residential yards adjacent to the National Zinc site. KDHE's Niton 733 X-ray fluorescence unit (XRF) was utilized to field analyze surficial soil samples. Multiple heavy metals, especially lead, arsenic and cadmium were identified to be present in residential yards in excess of background and KDHE residential RSK levels.

In addition, eleven (11) residences indicated areas of impacted surficial soil in residential yards above KDHE's residential RSK level of 400 mg/kg. Based on information gathered during the RSE, eligible conditions exist for further removal response consistent with §§ 300.410-300.415 of the NCP. The specific conditions identified at the site consistent with § 300.415(b)(2) are:

Actual or potential exposure from oil releases or hazardous substances exists at the site from elevated levels of primarily lead and cadmium from abandoned smelter operations. Private residential yards adjacent to the smelter works have been identified to be impacted with lead above residential RSKs (§ 300.415(b)(2)(i));

Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released is present since continued release of metals to surface water, soil and sediment will occur unless wastes are stabilized or covered; (§ 300.415(b)(2)(v));

No KDHE or other State mechanism is in place to address the wastes present at the site or impacted residential yards (§ 300.415(b)(2)(vii)); and

Other factors include the easy access to the site with no access or security limitations to the smelter site or areas of impacted residential yards (§ 300.415(b)(2)(viii)). Approximately 2,500 persons live within one mile of the site.

The site thus appears to qualify for further removal response actions at the site consistent with § 300.415 of the NCP considering the above factors from the NCP. Furthermore, the site may also qualify for further remedial response actions consistent with § 300.420-300.425 of the NCP (see Section 6.3 below). Initial response options and recommendations are discussed below.

6.2 Removal Response Considerations

Removal response at the site should address impacted residential yards and areas of elevated lead levels along publically accessible areas of Front and Martin Streets. Potential response actions to impacted private yards include excavation or covering in those areas identified through this KDHE RSE Report. Maximum levels of lead detected at the site did not fail TCLP threshold criteria, and any removed soils should not need to be handled as potential RCRA characteristic hazardous waste (D008). High-volume (high-vol) air monitoring for heavy metal particulates should also be conducted before, during and after any response actions to assure transmission of heavy metals does not occur to nearby residents.

Additional sampling is also appropriate to evaluate additional residential yards potentially impacted by heavy metal contamination. Deeper soil sampling across the site may also assist in computing soil removal volumes if physical removal is contemplated, however deeper sampling will be of limited use if clean topsoil will be brought in to cover impacted areas instead (a common approach to addressing larger areas of impacted residential yards).

6.3 Remedial Response Considerations

The Expanded Site Inspection (ESI) for the National Zinc site is also underway, and data from this RSE will be used to support ESI findings and conclusions consistent with § 300.420-300.425 of the NCP especially with regards to the soil pathway. The National Zinc site will be re-evaluated by the Hazard Ranking System (HRS) at the conclusion of the ESI to determine its eligibility for inclusion on the National Priorities List (NPL).

Response actions to residential yards should be consistent with the overall remedial actions for the National Zinc site. If the site is determined not to be eligible for NPL listing, the identified impacted residential yards should be addressed through further time-critical removal response consistent with the NCP. A more comprehensive target search and evaluation beyond the scope of this RSE will be conducted during the ESI to fully evaluate potential and actual target populations and environmental conditions impacted by releases or a threat of release of hazardous substances from the site. Eligibility of the site for inclusion on the National Priorities List (NPL) consistent with § 300.425 of the NCP may greatly influence the priority of future site-wide response actions.

6.4 Enforcement Considerations

An initial search of potentially responsible parties (PRPs) has been completed by EPA Region VII. No viable PRPs have been identified to date. EPA may elect to continue PRP search activities after completion of the ESI/HRS/NPL listing and/or removal response activities.

6.5 Conclusions

Contamination in residential yards identified in this RSE appears to present a significant threat to human health and the environment from actual or potential releases or threat of release of hazardous substances, especially lead, cadmium and arsenic, to residents in the area of the site. Releases of heavy metals have been attributed to the National Zinc site located directly adjacent to the north of the residential area targeted for this RSE. Removal response actions at these private yards are recommended to be the first priority for removal response actions at the site.

Further removal site evaluation consistent with § 300.415 of the NCP is recommended to further evaluate residential yards south of the area identified in this RSE. KDHE is currently in the planning stages of the Phase II RSE to evaluate yards south to First Street between Catherine and Coyle Streets.

The site may also qualify for further remedial site assessment consistent with § 300.420 of the NCP. The results of this RSE and previous data will be used by KDHE to update and re-evaluate the Hazard Ranking System II (HRS II) Pre-Score and in completing the ESI to determine if the entire National Zinc site is a candidate for listing on the National Priorities List (NPL) consistent with § 300.420-300.425 of the NCP. Given the size and nature of the site, response actions site-wide may be more appropriately addressed through listing the site on the NPL if a cooperative PRP is not identified to conduct response actions under KDHE or EPA oversight.

SECTION 7.0: REFERENCES

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Draft Toxicological Profile for Lead, May, 1994;.
Draft Toxicological Profile for Cadmium, May, 1994.
Draft Toxicological Profile for Arsenic, May, 1994.
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21. Kansas Department of Health and Environment, Bureau of Environmental Remediation, *Brownfields Targeted Assessment of the National Zinc Site*, CERCLIS I.D. # KSD980406698, December, 1999.

22. U.S. Environmental Protection Agency, Office of Solid Waste, Method 6200: *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soils and Sediment* (EPA Method 6200), 1998.

23. U.S. Environmental Protection Agency, *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA*, EPA/540/R-93/057, 1993.

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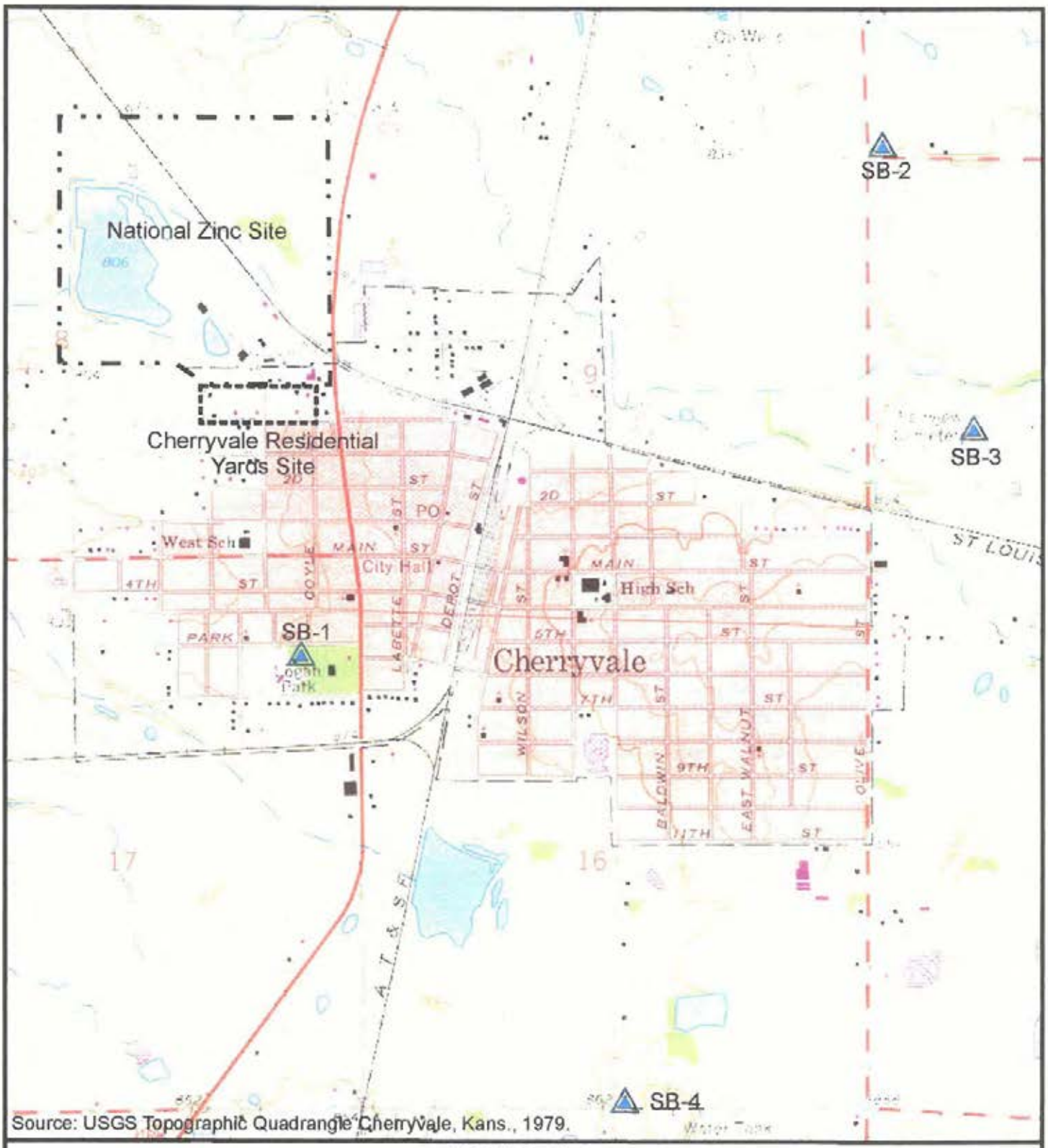
25. U.S. Environmental Protection Agency, *Guidance for Data Usability in Site Assessment*, EPA/OSWER/9345.1-05, 1993.

26. Kansas Department of Health and Environment, *Quality Assurance Project Plan (QAPP) for the Removal Site Evaluation (RSE) of the Cherryvale Residential Yards Site*, KDHE/BER, February, 2001.

ATTACHMENT A

FIGURES AND TABLES



Source: USGS Topographic Quadrangle Cherryvale, Kans., 1979.

FIGURE 1
SITE AREA MAP
WITH SOIL BACKGROUND
SAMPLE LOCATIONS
Cherryvale Residential Yards Site
Removal Site Evaluation
Cherryvale, Kansas
March 2001

SB- Background Soil Sample Location

N
W E
S

Approximate Scale: 1 inch = 1400 feet

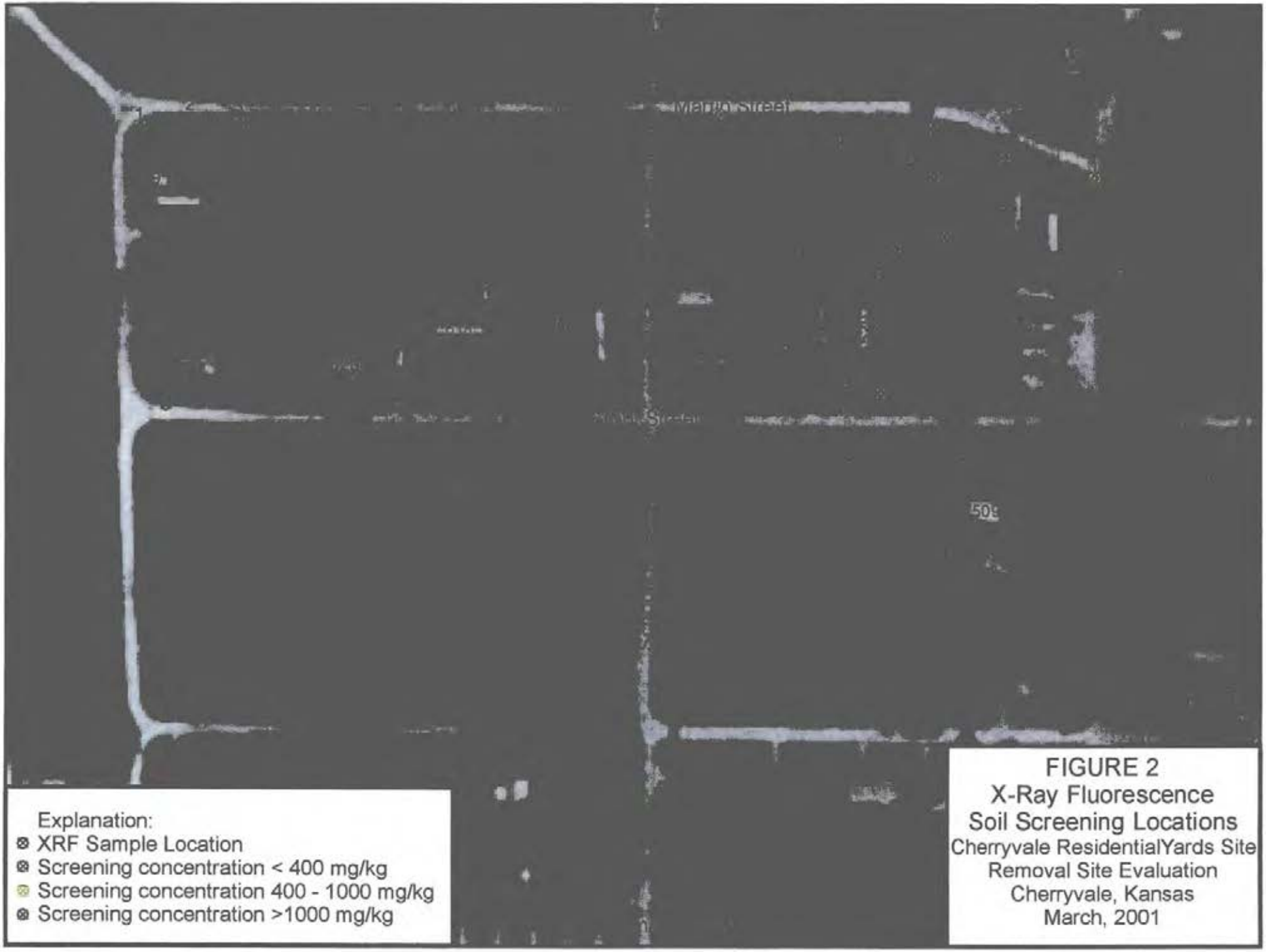


FIGURE 2
X-Ray Fluorescence
Soil Screening Locations
Cherryvale ResidentialYards Site
Removal Site Evaluation
Cherryvale, Kansas
March, 2001

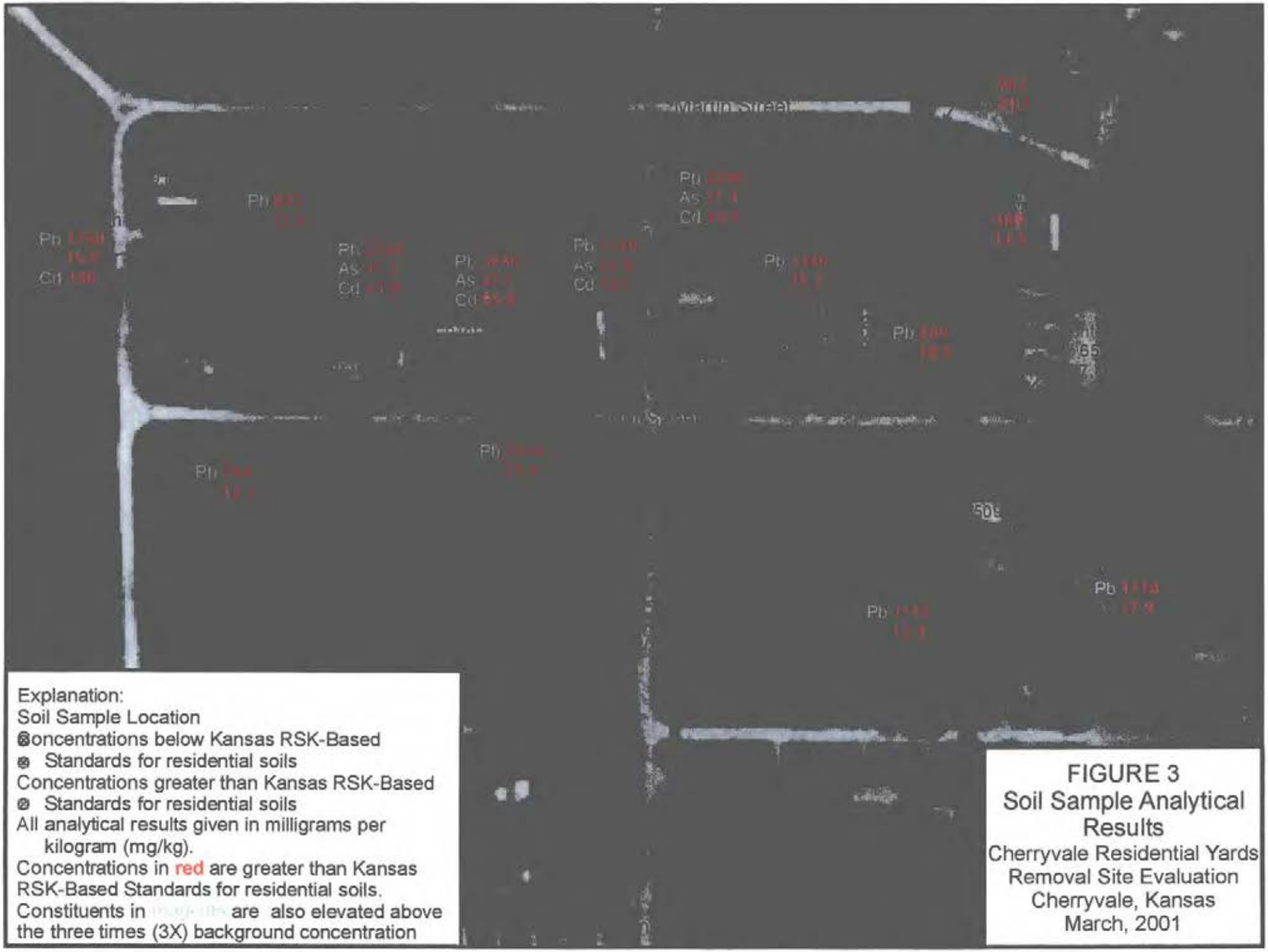


FIGURE 3
Soil Sample Analytical Results
Cherryvale Residential Yards
Removal Site Evaluation
Cherryvale, Kansas
March, 2001

Table 1(a)
Surficial Soil X-Ray Fluorescence (XRF) Analysis Data Summary (Wet Samples)

Sample I.D.:	Run Time (Ss):	Source:	Lead (Wet) (mg/kg):	Comments/Three Point Average Concentration:
509 Front #1	31	Cd-109	723 ± 61	
509 Front #1	32	Cd-109	413 ± 37	
509 Front #1	34	Cd-109	506 ± 51	Ave.= **547.3**
509 Front #2	31	Cd-109	542 ± 57	
509 Front #2	31	Cd-109	752 ± 75	
509 Front #2	31	Cd-109	595 ± 60	Ave.= **629.7**
509 Front #5	31	Cd-109	295 ± 45	
509 Front #5	31	Cd-109	257 ± 42	
509 Front #5	35	Cd-109	349 ± 49	Ave.=300.3
513 Front #1	63	Cd-109	485 ± 65	
513 Front #1	34	Cd-109	472 ± 49	
513 Front #1	39	Cd-109	426 ± 53	Ave.=461.0
513 Front #2	32	Cd-109	75.1 ± 29	
513 Front #2	35	Cd-109	113 ± 30	
513 Front #2	32	Cd-109	51 ± 25	Ave.=79.7
513 Front #3	34	Cd-109	839 ± 62	Lab Sample
513 Front #3	34	Cd-109	520 ± 49	
513 Front #3	38	Cd-109	513 ± 50	Ave.=**624.0**
513 Front #4	31	Cd-109	247 ± 45	
513 Front #4	31	Cd-109	276 ± 45	
513 Front #4	31	Cd-109	254 ± 40	Ave.=259.0
513 Front #5	31	Cd-109	271 ± 44	
513 Front #5	31	Cd-109	327 ± 46	
513 Front #5	45	Cd-109	324 ± 37	Ave.= 307.3
520 Front #1	41	Cd-109	647 ± 52	
520 Front #1	31	Cd-109	611 ± 61	

Table 1(a)(continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (Wet) (mg/kg):	Comments/Three Point Average Concentration:
520 Front #1	31	Cd-109	456 ± 56	Ave.= **571.3**
520 Front #3	31	Cd-109	492 ± 55	Lab Sample
520 Front #3	31	Cd-109	460 ± 54	
520 Front #3	41	Cd-109	630 ± 52	Ave.= **527.3**
520 Front #5	34	Cd-109	859 ± 75	
520 Front #5	34	Cd-109	259 ± 36	
520 Front #5	37	Cd-109	1090 ± 74	
520 Front #5	34	Cd-109	994 ± 75	Ave.= **800.5** (Duplicate)
524 Martin #1	49	Cd-109	176 ± 28	(Actual address 524 Front)
524 Martin #1	31	Cd-109	180 ± 38	
524 Martin #1	31	Cd-109	146 ± 43	Ave.= 167.3
524 Front #2	31	Cd-109	1090 ± 85	
524 Front #2	31	Cd-109	506 ± 48	
524 Front #2	34	Cd-109	470 ± 45	Ave.= **688.7**
524 Front #3	37	Cd-109	723 ± 56	Lab Sample
524 Front #3	31	Cd-109	409 ± 45	
524 Front #3	31	Cd-109	1000 ± 80	Ave.= **710.7**
524 Front #4	34	Cd-109	666 ± 94	
524 Front #4	31	Cd-109	966 ± 69	
524 Front #4	31	Cd-109	618 ± 50	Ave.= **750.0**
536 Martin	31	Cd-109	134 ± 31	(Actual address 536 Front)
536 Martin	31	Cd-109	161 ± 37	
536 Martin	31	Cd-109	144 ± 34	Ave.= 146.3
610 Front #1	34	Cd-109	804 ± 71	Lab Sample
610 Front #1	37	Cd-109	818 ± 68	
610 Front #1	33	Cd-109	913 ± 74	Ave.= **845.0**
610 Front #2	31	Cd-109	488 ± 61	
610 Front #2	34	Cd-109	319 ± 35	

Table 1(a)(continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (Wet) (mg/kg):	Comments/Three Point Average Concentration:
610 Front #2	35	Cd-109	317 ± 34	Ave.= 374.7
617 Front #1	37	Cd-109	1150 ± 65	
617 Front #1	34	Cd-109	1280 ± 84	
617 Front #1	33	Cd-109	1330 ± 76	Ave.= **1,253.3**
617 Front #2	34	Cd-109	724 ± 54	Lab Sample
617 Front #2	34	Cd-109	837 ± 60	
617 Front #2	31	Cd-109	861 ± 73	Ave.= **807.3**
617 Front #3	31	Cd-109	523 ± 55	
617 Front #3	31	Cd-109	637 ± 67	
617 Front #3	31	Cd-109	740 ± 81	Ave.= **633.3**
617 Front #4	38	Cd-109	495 ± 51	
617 Front #4	35	Cd-109	512 ± 52	
617 Front #4	31	Cd-109	766 ± 66	Ave.= **591.0**
617 Front #5	37	Cd-109	1530 ± 90	
617 Front #5	34	Cd-109	2000 ± 100	
617 Front #5	31	Cd-109	867 ± 76	Ave.= **1,465.6**
617 Front #6	31	Cd-109	928 ± 60	
617 Front #6	31	Cd-109	812 ± 66	
617 Front #6	34	Cd-109	971 ± 68	
617 Front #6	31	Cd-109	800 ± 65	Ave.=**877.8**
618 Front #1	34	Cd-109	2050 ± 100	Lab Sample
618 Front #1	34	Cd-109	1240 ± 74	
618 Front #1	34	Cd-109	2460 ± 110	Ave.= **1,916.7**
618 Front #2	33	Cd-109	1780 ± 94	Lab Sample
618 Front #2	33	Cd-109	1790 ± 96	
618 Front #2	33	Cd-109	1850 ± 97	Ave.= **1,806.7**
618 Front #3	31	Cd-109	77 ± 27	

Table 1(a)(continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (Wet) (mg/kg):	Comments/Three Point Average Concentration:
618 Front #3	31	Cd-109	81.5 ± 25	
618 Front #3	31	Cd-109	1150 ± 82	
618 Front #3	38	Cd-109	1100 ± 73	
618 Front #3	31	Cd-109	104 ± 26	Ave.= **502.5**
621 Front #1	31	Cd-109	435 ± 47	Lab Sample
621 Front #1	41	Cd-109	416 ± 40	
621 Front #1	42	Cd-109	365 ± 41	Ave.= **405.3**
621 Front #2	34	Cd-109	49.3 ± 21	Lab Sample
621 Front #2	35	Cd-109	142 ± 31	
621 Front #2	35	Cd-109	124 ± 29	Ave.= 105.1
619 Martin #4	31	Cd-109	593 ± 57	Lab Sample
619 Martin #4	31	Cd-109	593 ± 54	
619 Martin #4	37	Cd-109	718 ± 55	Ave.= **634.7**
619 Martin #5	41	Cd-109	834 ± 79	
619 Martin #5	31	Cd-109	1300 ± 74	
619 Martin #5	31	Cd-109	877 ± 88	Ave.= **1,003.7**
620 Martin	31	Cd-109	50.9 ± 19	Lab Sample
620 Martin	31	Cd-109	86.4 ± 27	
620 Martin	31	Cd-109	113 ± 30	Ave.= 83.4
Page #1	62	Cd-109	333 ± 30	Lab Sample
Page #1	61	Cd-109	485 ± 37	
Page #1	61	Cd-109	543 ± 38	Ave.= **453.7**
Page #2	61	Cd-109	397 ± 31	
Page #2	61	Cd-109	496 ± 39	
Page #2		Cd-109	420 ± 42	Ave.= **437.7**
Page #3	62	Cd-109	450 ± 38	
Page #3	62	Cd-109	615 ± 45	
Page #3	62	Cd-109	388 ± 38	Ave.= **484.3**

Table 1(a)(continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (Wet) (mg/kg):	Comments/Three Point Average Concentration:
Page #4	62	Cd-109	474 ± 38	Lab Sample
Page #4	62	Cd-109	463 ± 36	
Page #4	62	Cd-109	412 ± 35	Ave.= **449.7**
Page #5	62	Cd-109	415 ± 36	
Page #5	62	Cd-109	548 ± 42	
Page #5	62	Cd-109	606 ± 45	Ave.=**523.0**
Page #6	34	Cd-109	497 ± 49	
Page #6	34	Cd-109	586 ± 53	
Page #6	34	Cd-109	654 ± 57	Ave.= **579.0**
Page # 7	31	Cd-109	275 ± 35	
Page # 7	31	Cd-109	434 ± 46	
Page # 7	31	Cd-109	328 ± 38	Ave.= **345.7**
Martin Alley #1	31	Cd-109	360 ± 47	
Martin Alley #1	31	Cd-109	640 ± 64	
Martin Alley #1	32	Cd-109	542 ± 66	Ave.= **514.0**
Martin Alley #2	31	Cd-109	1070 ± 97	Lab Sample
Martin Alley #2	31	Cd-109	1070 ± 100	
Martin Alley #2	31	Cd-109	1040 ± 89	(Duplicate)
Martin Alley #2	31	Cd-109	1330 ± 96	Ave.= **1,127.5**
Martin Alley #3	30	Cd-109	1430 ± 99	
Martin Alley #3	33	Cd-109	1630 ± 100	
Martin Alley #3	33	Cd-109	1520 ± 96	Ave.= **1,526.7**
School S. Alley	32	Cd-109	361 ± 56	
School S. Alley	32	Cd-109	300 ± 43	
School S. Alley	32	Cd-109	334 ± 47	Ave.= 331.7
Coyle #1	31	Cd-109	310 ± 47	
Coyle #1	31	Cd-109	254 ± 42	

Table 1(a)(continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (Wet) (mg/kg):	Comments/Three Point Average Concentration:
Coyle #1	31	Cd-109	249 ± 41	
Coyle #1	34	Cd-109	233 ± 37	Ave.= 261.5 (Duplicate)
Coyle #2	31	Cd-109	360 ± 55	
Coyle #2	35	Cd-109	310 ± 49	
Coyle #2	89	Cd-109	318 ± 33	Ave.= 329.3
Coyle #3	31	Cd-109	160 ± 37	
Coyle #3	32	Cd-109	104 ± 33	
Coyle #3	32	Cd-109	179 ± 42	Ave.= 147.7
W Martin #1	34	Cd-109	405 ± 46	
W Martin #1	35	Cd-109	505 ± 56	
W Martin #1	34	Cd-109	284 ± 47	Ave.= 398
W. Martin #2	31	Cd-109	430 ± 50	
W. Martin #2	31	Cd-109	468 ± 49	(Duplicate)
W. Martin #2	31	Cd-109	585 ± 69	
W. Martin #2	31	Cd-109	573 ± 64	Ave.= **514.0**
W Martin #3	31	Cd-109	705 ± 67	
W Martin #3	34	Cd-109	473 ± 56	
W Martin #3	31	Cd-109	823 ± 72	Ave.= **667.0**
Martin #1	31	Cd-109	702 ± 75	
Martin #1	34	Cd-109	563 ± 61	
Martin #1	33	Cd-109	1070 ± 88	Ave.= **778.3**
Martin #2	33	Cd-109	1010 ± 84	
Martin #2	33	Cd-109	1280 ± 41	
Martin #2	35	Cd-109	944 ± 81	Ave.= **1,078.0**
Martin RROW W School #1	31	Cd-109	107 ± 31	
Martin RROW W School #1	31	Cd-109	88.1 ± 30	
Martin RROW W School #1	31	Cd-109	87.2 ± 28	Ave.= 94.1
Martin RROW West School	32	Cd-109	179 ± 45	

Table 1(a)(continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (Wet) (mg/kg):	Comments/Three Point Average Concentration:
Martin RROW West School	34	Cd-109	191 ± 37	
Martin RROW West School	31	Cd-109	189 ± 37	Ave.= 189.3
Martin RROW West School	31	Cd-109	198 ± 40	(Duplicate)
Front RROW East School #3	31	Cd-109	144 ± 38	
Front RROW East School #3	31	Cd-109	88.8 ± 24	
Front RROW East School #3	31	Cd-109	110 ± 33	Ave.= 114.3

Notes: All analyses conducted February and March, 2001. Results in milligrams per kilogram (mg/kg). Results in **bold** indicate levels greater than the KDHE RSK residential lead soil standard of 400 mg/kg. All analyses conducted according to EPA Method 6200 on wet samples (not oven-dried) with imprecision indicated as ± in mg/kg. Samples collected 0-6" depth. Average concentration calculated with simple three (3)-point average.

Table 1(b)
Surficial Soil X-Ray Fluorescence (XRF) Analysis Data Summary (Dried Samples)
Cherryvale Residential Yards Removal Site Evaluation

Sample I.D.:	Run Time (Ss):	Source:	Lead (mg/kg):	Comments/Three Point Average Concentration:
509 Front #1	31	Cd-109	752 ± 84	
509 Front #1	31	Cd-109	842 ± 81	
509 Front #1	31	Cd-109	986 ± 91	Ave.= **860.0**
509 Front #2	34	Cd-109	1,040 ± 91	
509 Front #2	33	Cd-109	1,400 ± 100	
509 Front #2	34	Cd-109	1,180 ± 110	Ave.= **1,206.7**
509 Front #3	31	Cd-109	298 ± 46	Lab Sample
509 Front #3	31	Cd-109	237 ± 44	
509 Front #3	31	Cd-109	254 ± 47	Ave.= 263.0
509 Front #4	34	Cd-109	1,430 ± 110	Lab Sample
509 Front #4	44	Cd-109	1260 ± 83	
509 Front #4	34	Cd-109	1,540 ± 110	Ave.= **1,410.0**
509 Front #5	31	Cd-109	456 ± 61	
509 Front #5	31	Cd-109	354 ± 54	
509 Front #5	31	Cd-109	358 ± 59	Ave.= 389.3
513 Front #1	31	Cd-109	365 ± 54	
513 Front #1	31	Cd-109	1,040 ± 85	
513 Front #1	31	Cd-109	682 ± 72	Ave.= **695.7**
513 Front #2	31	Cd-109	57 ± 30	
513 Front #2	31	Cd-109	98.2 ± 33	
513 Front #2	34	Cd-109	114 ± 41	Ave.= 89.7
513 Front #3	31	Cd-109	880 ± 87	Lab Sample
513 Front #3	37	Cd-109	859 ± 71	
513 Front #3	31	Cd-109	759 ± 82	Ave.= **832.7**
513 Front #4	31	Cd-109	196 ± 34	

Table 1(b) (continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (mg/kg):	Comments/ Average Concentration:
513 Front #4	31	Cd-109	297 ± 54	
513 Front #4	31	Cd-109	334 ± 57	Ave.= 275.7
513 Front #5	34	Cd-109	414 ± 59	
513 Front #5	35	Cd-109	375 ± 61	
513 Front #5	35	Cd-109	422 ± 58	Ave.= **403.7**
520 Front #1	34	Cd-109	722 ± 77	
520 Front #1	34	Cd-109	711 ± 81	
520 Front #1	34	Cd-109	685 ± 73	Ave.= **706.0**
520 Front #2	35	Cd-109	224 ± 60	
520 Front #2	44	Cd-109	669 ± 66	
520 Front #2	31	Cd-109	357 ± 63	Ave.= **415.0**
520 Front #3	34	Cd-109	930 ± 63	Lab Sample
520 Front #3	34	Cd-109	914 ± 84	
520 Front #3	34	Cd-109	1,050 ± 87	Ave.= **996.0**
520 Front #3	41	Cd-109	1,090 ± 82	(Duplicate)
520 Front #5	34	Cd-109	1,180 ± 100	
520 Front #5	35	Cd-109	850 ± 100	
520 Front #5	34	Cd-109	544 ± 77	Ave.= **858.0**
524 Martin #1	31	Cd-109	282 ± 55	(Actual address 524 Front)
524 Martin #1	34	Cd-109	213 ± 55	
524 Martin #1	34	Cd-109	204 ± 45	Ave.= 233
524 Front #2	35	Cd-109	723 ± 98	
524 Front #2	34	Cd-109	968 ± 85	
524 Front #2	34	Cd-109	1,360 ± 110	Ave.= **1,017.0**
524 Front #3	34	Cd-109	1,120 ± 91	Lab Sample
524 Front #3	34	Cd-109	894 ± 80	
524 Front #3	34	Cd-109	1,000 ± 93	Ave.= **1,004.7**
524 Front #4	34	Cd-109	1,190 ± 94	

Table 1(b) (continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (mg/kg):	Comments/Average Concentration:
524 Front #4	34	Cd-109	1,210 ± 90	
524 Front #4	34	Cd-109	1,300 ± 110	Ave.= **1,233.3**
536 Martin	35	Cd-109	142 ± 39	**(Actual address 536 Front)**
536 Martin	35	Cd-109	183 ± 43	
536 Martin	35	Cd-109	155 ± 41	Ave.= 160.0
610 Front #1	33	Cd-109	1,080 ± 110	Lab Sample
610 Front #1	33	Cd-109	1,440 ± 110	
610 Front #1	34	Cd-109	1,270 ± 120	Ave.= **1,263.3**
610 Front #2	34	Cd-109	773 ± 77	
610 Front #2	34	Cd-109	817 ± 78	
610 Front #2	34	Cd-109	1,030 ± 99	Ave.= **873.3**
617 Front #1	33	Cd-109	2,700 ± 180	
617 Front #1	31	Cd-109	1,370 ± 140	
617 Front #1	33	Cd-109	1,890 ± 120	Ave.= **1,986.7**
617 Front #2	34	Cd-109	2,840 ± 160	Lab Sample
617 Front #2	34	Cd-109	1,640 ± 110	
617 Front #2	34	Cd-109	1,520 ± 110	
617 Front #2	34	Cd-109	1,460 ± 110	Ave.= **2,486.7**
617 Front #3	34	Cd-109	940 ± 86	
617 Front #3	34	Cd-109	1,050 ± 93	
617 Front #3	34	Cd-109	1,100 ± 93	Ave.= **1,030.0**
617 Front #4	31	Cd-109	212 ± 44	
617 Front #4	31	Cd-109	646 ± 84	
617 Front #4	31	Cd-109	653 ± 72	
617 Front #4	31	Cd-109	735 ± 79	Ave.= **585.2**
617 Front #4	31	Cd-109	680 ± 75	(Duplicate)
617 Front #5	34	Cd-109	1,690 ± 110	
617 Front #5	31	Cd-109	1,400 ± 110	Ave.= **1,395.0**

Table 1(b) (continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (mg/kg):	Comments/Average Concentration:
617 Front #5	34	Cd-109	1,320 ± 110	(Duplicate)
617 Front #6	34	Cd-109	1,650 ± 110	
617 Front #6	31	Cd-109	1,290 ± 100	
617 Front #6	31	Cd-109	1,450 ± 120	Ave.= **1,463.3**
618 Front #1	33	Cd-109	3,670 ± 170	Lab Sample
618 Front #1	33	Cd-109	1,830 ± 96	
618 Front #1	34	Cd-109	2,690 ± 160	Ave.= **2,760.0**
618 Front #2	33	Cd-109	2,190 ± 130	Lab Sample
618 Front #2	31	Cd-109	2,200 ± 190	
618 Front #2	34	Cd-109	2,440 ± 150	Ave.= **2,276.7**
618 Front #3	31	Cd-109	123 ± 35	
618 Front #3	36	Cd-109	183 ± 40	
618 Front #3	31	Cd-109	127 ± 38	Ave.= 144.3
621 Front #1	31	Cd-109	646 ± 74	Lab Sample
621 Front #1	31	Cd-109	587 ± 73	
621 Front #1	34	Cd-109	678 ± 62	Ave.= **637.0**
621 Front #2	31	Cd-109	96.1 ± 34	Lab Sample
621 Front #2	32	Cd-109	128 ± 37	
621 Front #2	37	Cd-109	187 ± 38	Ave.= 137.0
619 Martin #4	38	Cd-109	670 ± 57	Lab Sample
619 Martin #4	34	Cd-109	712 ± 65	
619 Martin #4	34	Cd-109	736 ± 65	Ave.= **706.0**
619 Martin #5	34	Cd-109	1,240 ± 86	
619 Martin #5	34	Cd-109	1,350 ± 94	
619 Martin #5	34	Cd-109	1,230 ± 90	Ave.= **1,273.3**
620 Martin	34	Cd-109	188 ± 43	Lab Sample
620 Martin	35	Cd-109	97.2 ± 38	
620 Martin	34	Cd-109	128 ± 38	Ave.= 137.7

Table 1(b) (continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (mg/kg):	Comments/Average Concentration:
Page #1	34	Cd-109	610 ± 63	Lab Sample
Page #1	31	Cd-109	484 ± 65	
Page #1	34	Cd-109	602 ± 67	Ave.= **565.3**
Page #2	35	Cd-109	316 ± 50	
Page #2	31	Cd-109	562 ± 73	
Page #2	31	Cd-109	479 ± 67	Ave.= **452.3**
Page #3	34	Cd-109	714 ± 70	
Page #3	30	Cd-109	461 ± 56	
Page #3	34	Cd-109	442 ± 49	Ave.= **508.3**
Page #3	40	Cd-109	416 ± 42	(Duplicate)
Page #4	34	Cd-109	460 ± 53	Lab Sample
Page #4	31	Cd-109	523 ± 64	
Page #4	35	Cd-109	482 ± 54	Ave.= **488.3**
Page #5	34	Cd-109	556 ± 56	
Page #5	31	Cd-109	493 ± 54	
Page #5	31	Cd-109	656 ± 68	Ave.=**580.8**
Page #5	34	Cd-109	618 ± 62	(Duplicate)
Page #6	34	Cd-109	630 ± 59	
Page #6	34	Cd-109	576 ± 59	
Page #6	37	Cd-109	737 ± 65	Ave.= **647.7**
Page # 7	34	Cd-109	800 ± 78	
Page # 7	34	Cd-109	864 ± 80	
Page # 7	34	Cd-109	740 ± 74	Ave.= **790.3**
Page # 7	34	Cd-109	757 ± 71	(Duplicate)
Martin Alley #1	35	Cd-109	735 ± 84	
Martin Alley #1	34	Cd-109	764 ± 74	
Martin Alley #1	35	Cd-109	676 ± 95	Ave.= **725.0**
Martin Alley #2	34	Cd-109	1,480 ± 110	Lab Sample

Table 1(b) (continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (mg/kg):	Comments/Average Concentration:
Martin Alley #2	33	Cd-109	2,270 ± 140	
Martin Alley #2	35	Cd-109	1,190 ± 130	Ave.= **1,646.7**
Martin Alley #3	37	Cd-109	1,590 ± 110	
Martin Alley #3	33	Cd-109	1,720 ± 120	
Martin Alley #3	33	Cd-109	1,650 ± 130	Ave.= **1,653.3**
School S. Alley	32	Cd-109	577 ± 82	
School S. Alley	35	Cd-109	383 ± 70	
School S. Alley	35	Cd-109	396 ± 72	Ave.= **452.0**
Coyle #1	38	Cd-109	415 ± 54	
Coyle #1	34	Cd-109	454 ± 61	
Coyle #1	38	Cd-109	362 ± 53	Ave.= **410.3**
Coyle #2	31	Cd-109	350 ± 73	
Coyle #2	40	Cd-109	431 ± 61	
Coyle #2	34	Cd-109	332 ± 66	Ave.= 371.0
Coyle #3	31	Cd-109	169 ± 41	
Coyle #3	42	Cd-109	212 ± 39	
Coyle #3	31	Cd-109	139 ± 38	Ave.= 172.3
W Martin #1	34	Cd-109	431 ± 53	
W Martin #1	35	Cd-109	275 ± 46	
W Martin #1	34	Cd-109	524 ± 53	Ave.= **410.0**
W. Martin #2	35	Cd-109	410 ± 61	
W. Martin #2	35	Cd-109	386 ± 68	
W. Martin #2	34	Cd-109	493 ± 30	Ave.= **587.7**
W. Martin #2	34	Cd-109	474 ± 40	(Duplicate)
W Martin #3	30	Cd-109	843 ± 88	
W Martin #3	34	Cd-109	969 ± 87	
W Martin #3	34	Cd-109	816 ± 140	Ave.= **876.0**
Martin #1	33	Cd-109	887 ± 84	

Table 1(b) (continued)

Sample I.D.:	Run Time (Ss):	Source:	Lead (mg/kg):	Comments/Average Concentration:
Martin #1	33	Cd-109	986 ± 99	
Martin #1	34	Cd-109	795 ± 81	Ave.= **889.3**
Martin #2	33	Cd-109	938 ± 94	
Martin #2	33	Cd-109	1,370 ± 120	
Martin #2	35	Cd-109	800 ± 90	Ave.= **1,036.0**
Martin RROW W School #1	34	Cd-109	105 ± 36	
Martin RROW W School #1	31	Cd-109	153 ± 51	
Martin RROW W School #1	38	Cd-109	62.1 ± 34	Ave.= 106.7
Martin RROW West School	34	Cd-109	268 ± 57	
Martin RROW West School	34	Cd-109	303 ± 55	
Martin RROW West School	34	Cd-109	247 ± 47	Ave.= 363.7
Martin RROW West School	41	Cd-109	273 ± 44	(Duplicate)
Front RROW East School #3	35	Cd-109	94 ± 35	
Front RROW East School #3	34	Cd-109	204 ± 41	
Front RROW East School #3	31	Cd-109	117 ± 35	Ave.= 138.3

Notes: All analyses conducted February and March, 2001. Results in milligrams per kilogram (mg/kg). Results in **bold** indicate levels greater than the KDHE RSK residential lead soil standard of 400 mg/kg. All analyses conducted according to EPA Method 6200 on wet samples (not oven-dried) with imprecision indicated as ± in mg/kg. Samples collected 0-6" depth. Average concentration calculated with simple three (3)-point average.

Table 2(a)
Laboratory Results for Background Soil Samples

Sample I.D.:	Lead (mg/kg):	Arsenic (mg/kg):	Cadmium (mg/kg):	Chromium (mg/kg):	Mercury (mg/kg):
SB-1	209.03	6.36	5.4	13.08	0.0426
SB-2	38.3	8.0	0.6	19.4	ND(0.1)
SB-3	15.7	5.7	0.6	13.5	ND(0.1)
SB-4	28.1	6.8	0.3	17.7	ND(0.1)
3X Max. Value (3XMAX)	627.1	24.0	16.2	58.2	0.3
3X Mean	130.1	20.0	2.6	47.1	0.1

Note: All samples obtained 03/01. Red indicates levels in excess of residential RSK levels. Magenta indicates results in excess of 3XMAX background concentration but not in excess of RSK levels. The **bold red** levels indicate constituent levels in excess of residential RSKs **and** 3XMAX concentration.
Analysis conducted by EPA Method 6010 (except mercury) and EPA Method 7471 (mercury) by Division of Health and Environment Laboratories (DHEL), Topeka, Kansas; Heritage Environmental Services, Indianapolis, Indiana; and Pace Analytical Services, Lenexa, Kansas.
ND: Not Detected

Table 2(b)
Laboratory Results for Confirmatory Samples

Sample I.D.:	Lead (mg/kg):	Arsenic (mg/kg):	Cadmium (mg/kg):	Chromium (mg/kg):	Mercury (mg/kg):
620 Martin	142	13.1	3.0	25.1	ND(0.1)
Page #1	562.0	21.1	18.8	17.5	0.3
Page #4	489.0	14.5	17.7	16.3	0.3
520 Front #3	**805.0**	18.5	25.0	18.6	0.4
Martin Alley #2	**2,090.0**	**31.4**	**40.8**	21.1	-
619 Martin #4	**843.0**	11.8	25.8	14.1	-
619 Martin #5	**1,750.0**	16.0	**180.0**	31.8	0.7
Front RROW #3	65.0	7.4	1.6	22.9	ND(0.1)
524 Front #4	**1,450.0**	15.2	26.2	17.5	0.4
618 Front #2	**3,680.0**	**33.7**	**55.8**	19.3	0.8
617 Front #2	**1,660.0**	21.8	32.8	15.9	0.8
621 Front #2	152	6.6	5.4	21.7	ND(0.1)
618 Front #1	**3,190.0**	**31.3**	**41.0**	18.1	0.7
513 Front #3	**1,110.0**	12.4	28.4	17.0	0.5
509 Front #4	**1,710.0**	17.9	32.3	29.0	0.6
513 Front #2	85.0	6.4	3.4	17.4	ND(0.1)
509 Front #3	227.0	7.6	5.9	19.9	0.1
610 Front #1	**1,540.0**	**26.8**	**121.0**	15.3	1.0
621 Front #1	**764.0**	12.1	23.3	16.6	0.2

Note: All samples obtained 03/01. Red indicates levels in excess of residential RSK levels. Magenta indicates results in excess of 3XMAX background concentration but not in excess of RSK levels. The **bold red** levels indicate constituent levels in excess of residential RSKs **and** 3XMAX concentration.
Analysis conducted by EPA Method 6010 (except mercury) and EPA Method 7471 (mercury) by Division of Health and Environment Laboratories (DHEL), Topeka, Kansas; Heritage Environmental Services, Indianapolis, Indiana; and Pace Analytical Services, Lenexa, Kansas.
ND: Not Detected

Table 3
Summary of Toxicity Characteristic Leachate Procedure (TCLP) Laboratory Results for Soil Samples

Sample I.D.:	Total Lead (mg/kg)	TCLP Lead (mg/l)
Page # 4	489	0.14
Martin Alley #2	2,090	1.92
619 Martin #4	843	0.36
619 Martin #5	1,750	0.69
618 Front #2	3,680	2.21
618 Front #1	3,190	2.12
513 Front #3	1,110	0.34
610 Front #1	1,540	4.97

Note: All samples obtained 08-09/00. Violet indicates waste profile Toxicity Characteristic Leachate Procedure (TCLP) results in excess of criteria established in § 261.24 of the Resource Conservation and Recovery Act (RCRA). Analysis conducted by EPA Method 6010 (except mercury), EPA Method 7471 (mercury) and EPA Method 1311 (TCLP) by Heritage Environmental Services, Indianapolis, Indiana.
ND: Not Detected

Table 4
Comparison of XRF and Laboratory Data

Sample ID:	Lead by XRF Analysis wet (undried) samples (mg/kg):	Lead by XRF Analysis dried samples (mg/kg):	Lead by EPA Method 6010 (mg/kg):
620 Martin	83.4	137.7	142
Page 1	453.7	565.3	562
Page 4	449.7	488.3	489
520 Front #3	527.3	996.0	805
Martin Alley #2	1,127.5	1,646.7	2,090
619 Martin #4	634.7	706.0	843
619 Martin #5	1,003.7	1,273.3	1,750
Front RROW #3	114.3	138.3	65.0
524 Front #4	750.0	1,233.3	1,450
618 Front #2	1,803.7	2,276.7	3,680
617 Front #2	807.3	2,486.7	1,660
621 Front #2	105.1	137.0	152
618 Front #1	1,916.7	2,760.0	3,190
513 Front #3	624.0	832.7	1,110
509 Front #4	NA	1,410.0	1,710
513 Front #2	79.7	89.7	85.0
509 Front #3	NA	263.0	227
610 Front #1	845.0	1,263.3	1,540
621 Front #1	405.3	637.0	764

Wet Sample (Undried) Lead Linear Regression Parameters:		
$r^2 = 0.971$	Degrees of Freedom = 16	Number of Observations = 18
Constant = 87.746	Standard Error of Y Estimate = 94.733	Slope (X Coefficient)= 0.507

Dried Sample Lead Linear Regression Parameters:		
$r^2 = 0.924$	Degrees of Freedom = 17	Number of Observations = 19
Constant = 142.203	Standard Error of Y Estimate = 217.063	Slope (X Coefficient)= 0.718

Table 5(a)
XRF Quality Control (QC) Parameters Summary/NIST Standards

NIST Standard	Date:	XRF Lead (mg/kg):	NIST Standard Value:	Percent Difference (%PD):
High	3/05/01	5,090	5,532	7.99
High	3/05/01	5,010	5,532	9.44
High	3/06/01	5,030	5,532	9.07
High	3/06/01	5,020	5,532	9.26
High	3/06/01	4,860	5,532	12.15
High	3/06/01	5,050	5,532	8.71
High	3/27/01	5,010	5,532	9.44
High	3/27/01	5,040	5,532	8.89
High	3/27/01	5,140	5,532	7.09
High	3/15/01	5,190	5,532	6.18
High	3/15/01	5,120	5,532	7.45
High	3/15/01	5,180	5,532	6.36
Medium	3/06/01	1,050	1,162	9.64
Medium	3/06/01	1,020	1,162	12.22
Medium	3/06/01	1,020	1,162	12.22
Medium	3/06/01	1,000	1,162	13.94
Medium	3/07/01	1,050	1,162	9.64
Medium	3/07/01	1,020	1,162	12.22
Medium	3/16/01	1,030	1,162	11.36
Medium	3/16/01	1,020	1,162	12.22
Medium	3/08/01	1,060	1,162	8.78
Medium	3/08/01	996	1,162	14.29
Average PD = % 9.29				

Notes: All samples collected 03/01 by KDHE/BER/Site Assessment Unit. XRF: X-Ray Fluorescence. Analytical methods referenced to EPA *Method SW-846, Methods for Analysis of Solid Waste.* Percent difference for standards calculated by $((C_s - C_k) / C_k \times 100$ where C_k = certified National Institute of Standards and Testing (NIST) lead concentration value of medium standard, 1,162 ± 31 mg/kg; concentration of high standard, 5532 mg/kg ± 100 mg/kg; C_s = measured in-field XRF lead concentration of standard. RSD calculated by RSD = (SD/Mean Concentration) X 100 where SD = standard deviation of the concentration for the analyte and Mean Concentration = mean concentration for the analyte

Table 5(b): Relative Standard Deviation Results for XRF Field Duplicate Values

Sample ID:	First Value: (mg/kg):	Second Value: (mg/kg):	Standard Deviation:	Relative Standard Deviation (RSD):
Undried Samples:				
520 Front #5	1,090	994	48	4.61
Martin Alley #2	1,070	1,040	15	1.42
Coyle #1	249	233	8	3.32
W. Martin #2	430	468	19	4.23
Martin RROW W. School	189	198	4.5	2.33
Medium Standard	1,020	1,020	0	0
High Standard	5,030	5,020	5	0.10
Dried Samples:				
520 Front #3	1050	1090	20	1.87
617 Front #4	735	680	27.5	3.89
617 Front #5	1400	1320	40	2.94
Page #3	442	416	13	3.03
Page #5	656	618	19	2.98
Page #7	740	757	8.5	1.14
W. Martin #2	493	474	9.5	1.96
Martin RROW W. School	247	273	13	5.0
Average RSD = 2.59				

Notes: All samples collected 03/01 by KDHE/BER/Site Assessment Unit. XRF: X-Ray Fluorescence Data Source: KDHE, 2001. Analytical methods referenced to EPA *Method SW-846, Methods for Analysis of Solid Waste.* Percent difference for standards calculated by $((C_s - C_k) / C_k \times 100$ where C_k = certified National Institute of Standards and Testing (NIST) lead concentration value of medium standard, 1,162 ± 31 mg/kg; concentration of high standard, 5532 mg/kg ± 100 mg/kg; C_s = measured in-field XRF lead concentration of standard. RSD calculated by RSD = (SD/Mean Concentration) X 100 where SD = standard deviation of the concentration for the analyte and Mean Concentration = mean concentration for the analyte.

No QC parameters (% PD or RSD) were exceeded consistent with EPA Method 6200 criteria (% PD > 20 or average RSD > 20).

ATTACHMENT B

PHOTOGRAPHIC DOCUMENTATION

Photo #1 - Cherryvale Residential Yards RSE Site

Date: 3/01
View: Southwest
Photographer: Randolph L. Brown
Comments: Overview of the residential area. The intersection of Martin and Coyle Streets is in the foreground.

Photo #2 - Cherryvale Residential Yards RSE Site

Date: 3/01
View: East
Photographer: Randolph L. Brown
Comments: Photo shows the residence at 511 Martin.

Photo #3 - Cherryvale Residential Yards RSE Site

Date: 3/01
View: East
Photographer: Randolph L. Brown
Comments: 619 Martin residence in the foreground, other residences in background.

Photo #4 - Cherryvale Residential Yards RSE Site

Date: 3/01
View: East
Photographer: Randolph L. Brown
Comments: Looking east on Front Street. 621 and 617 Front Street residences to the right.

Photo #5 - Cherryvale Residential Yards RSE Site

Date: 3/01
View: East
Photographer: Randolph L. Brown
Comments: Residence in foreground is vacant. 620, 618 and 610 Front Street in background.

Photo #6 - Cherryvale Residential Yards RSE Site

Date: 3/01
View: East
Photographer: Randolph L. Brown
Comments: 536, 524 and 520 Front Street residences.

Photo #7- Cherryvale Residential Yards RSE Site

Date: 3/01
View: East
Photographer: Randolph L. Brown
Comments: 513 and 509 Front Street residences.

ATTACHMENT C

ANALYTICAL DATA

DIVISION OF HEALTH & ENVIRONMENTAL LABORATORIES

Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101283PT

Site ID: 4EM80
Account Code: EP

Collection Location: C306300026 Nat. Zinc SB-1

Collector: Randy Brown-BER
Matrix: Soil
Collect Depth:
Date/Time Collected: 02/19/01 14:15
Date/Time Received: 02/21/01 17:00

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)		11840.71	mg/Kg	02/28/01	EPA 6010
Antimony (Total)	<	5.00	mg/Kg	02/28/01	EPA 6010
Arsenic (Total)		6.36	mg/Kg	02/28/01	EPA 6010
Barium (Total)		127.33	mg/Kg	02/28/01	EPA 6010
Beryllium (Total)		0.47	mg/Kg	02/28/01	EPA 6010
Boron (Total)	<	1.00	mg/Kg	02/28/01	EPA 6010
Cadmium (Total)		5.40	mg/Kg	02/28/01	EPA 6010
Calcium (Total)		3332.98	mg/Kg	02/28/01	EPA 6010
Chromium (Total)		13.08	mg/Kg	02/28/01	EPA 6010
Cobalt (Total)		4.21	mg/Kg	02/28/01	EPA 6010
Copper (Total)		31.70	mg/Kg	02/28/01	EPA 6010
Iron (Total)		11767.78	mg/Kg	02/28/01	EPA 6010
Lead (Total)		209.03	mg/Kg	02/28/01	EPA 6010
Magnesium (Total)		1226.63	mg/Kg	02/28/01	EPA 6010
Manganese (Total)		397.90	mg/Kg	02/28/01	EPA 6010
Mercury		0.0426	mg/Kg	02/27/01	EPA 245.2
Molybdenum (Total)	<	2.00	mg/Kg	02/28/01	EPA 6210
Nickel (Total)		8.58	mg/Kg	02/28/01	EPA 6210
Potassium (Total)		1933.64	mg/Kg	02/28/01	EPA 6210
Selenium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Silica (Total)		137.93	mg/Kg	02/28/01	EPA 6210
Silver (Total)	<	1.00	mg/Kg	02/28/01	EPA 6210
Sodium (Total)		133.89	mg/Kg	02/28/01	EPA 6210
Thallium (Total)	<	5.00	mg/Kg	02/28/01	EPA 6210
Vanadium (Total)		23.18	mg/Kg	02/28/01	EPA 6210
Zinc (Total)		675.78	mg/Kg	02/28/01	EPA 6210

Reporting Analyst: REH
Date Reported: 03/05/01

< - Not Detected at Indicated Level
* - Holding Time Exceeded

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03/29/2001

Kansas Dept. of Health & Environment
Attn: Randy Brown
740 Forbes Field
Topeka, KS 66620-0001

Date Received: 03/16/2001
Continental File No.: 5962
Continental Order No.: 69509
Project No.:
Your P.O.: 33322

Dear Mr. Brown:

This laboratory report consisting of 11 pages contains the analytical results for the following samples:

CAS LAB ID #	SAMPLE DESCRIPTION	SAMPLE TYPE	DATE SAMPLED
01031195	620 Martin	Solid	03/05/2001
01031196	Page 1	Solid	03/05/2001
01031197	Page 4	Solid	03/05/2001
01031198	520 Front #3	Solid	03/05/2001
01031199	Martin Alley #2	Solid	03/05/2001
01031200	SB-4	Solid	03/13/2001
01031201	SB-2	Solid	03/13/2001
01031202	SB-3	Solid	03/13/2001
01031203	614 Martin #4	Solid	03/05/2001
01031204	619 Martin #5	Solid	03/05/2001
01031205	Front Rrow #3	Solid	03/05/2001
01031206	524 Front #4	Solid	03/05/2001

The footnotes contained in the attached laboratory reports are summarized below for your reference.

CAS LAB ID #	TEST NAME	SAMPLE CONC.
01031202	Cadmium, Total	ND(0.6) M

M - Reporting limit higher than normal due to matrix interferences.

1804 Glendale Road • Salina, Kansas 67401-6675
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Analytical Services, Inc.

03/29/2001

Thank you for choosing Continental for this project. If you have any questions, please contact me at (800)-535-3076.

CONTINENTAL ANALYTICAL SERVICES, INC.

Gregory J. Groene
Project Manager

1804 GLENDALE ROAD • SALINA, KANSAS 67401-6675
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Continental
Analytical Services, Inc.

Client: Kansas Dept. of Health & Environment
Attn: Randy Brown
740 Forbes Field
Topeka, KS 66620-0001

Date Sample Rptd: 03/29/2001
Date Sample Recd: 03/16/2001
Continental File No: 5962
Continental Order No: 69509
Client P.O.:

Lab Number: 01031195
Sample Description: 620 Martin

Date Sampled: 03/05/2001
Time Sampled: 1600

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	13.1	mg/kg	03/21/2001	4866/5
Barium, Total	220.	mg/kg	03/21/2001	4866/5
Cadmium, Total	3.0	mg/kg	03/21/2001	4866/5
Chromium, Total	25.1	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	142.	mg/kg	03/21/2001	4866/4
Mercury, Total Soil	ND(0.1)	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	ND(1.0)	mg/kg	03/21/2001	4866/5
Silver, Total	1.5	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031195

Lab Number: 01031196
Sample Description: Page 1

Date Sampled: 03/05/2001
Time Sampled: 1130

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	21.1	mg/kg	03/21/2001	4866/5
Barium, Total	180.	mg/kg	03/21/2001	4866/5
Cadmium, Total	18.8	mg/kg	03/21/2001	4866/5
Chromium, Total	17.5	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	562.	mg/kg	03/21/2001	4866/5
Mercury, Total Soil	0.3	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	1.7	mg/kg	03/21/2001	4866/5
Silver, Total	2.2	mg/kg	03/21/2001	4866/5

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LABORATORY REPORT

Client: Kansas Dept. of Health & Environment
Lab Number: 01031196
Sample Description: Page 1

Analysis	Concentration	Units	Date Analyzed	Book/Page

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031196

Lab Number: 01031197
Sample Description: Page 4

Date Sampled: 03/05/2001
Time Sampled: 1145

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	0.14	mg/L	03/23/2001	4866/8
Arsenic, Total (ICP)	14.5	mg/kg	03/21/2001	4866/5
Barium, Total	180.	mg/kg	03/21/2001	4866/5
Cadmium, Total	17.7	mg/kg	03/21/2001	4866/5
Chromium, Total	16.3	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	489.	mg/kg	03/21/2001	4866/5
Mercury, Total Soil	0.3	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	1.4	mg/kg	03/21/2001	4866/5
Silver, Total	1.3	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/23/2001	010323-1	MAG	6010B
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B

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LABORATORY REPORT

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Lab Number: 01031197

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Silver, Total	03/19/2001	010319-4	MAG	6010B
TCLP Prep	03/20/2001	010320-1	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031197

Lab Number: 01031198
Sample Description: 520 Front #3

Date Sampled: 03/05/2001
Time Sampled: 1500

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	18.5	mg/kg	03/21/2001	4866/5
Barium, Total	200.	mg/kg	03/21/2001	4866/5
Cadmium, Total	25.0	mg/kg	03/21/2001	4866/5
Chromium, Total	18.6	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	805.	mg/kg	03/21/2001	4866/5
Mercury, Total Soil	0.4	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	1.5	mg/kg	03/21/2001	4866/5
Silver, Total	1.5	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031198

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LABORATORY REPORT

Client: Kansas Dept. of Health & Environment

Lab Number: 01031199
Sample Description: Martin Alley #2

Date Sampled: 03/05/2001
Time Sampled: 1430

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	1.92	mg/L	03/23/2001	4866/8
Arsenic, Total (ICP)	31.4	mg/kg	03/21/2001	4866/5
Barium, Total	190.	mg/kg	03/21/2001	4866/5
Cadmium, Total	40.8	mg/kg	03/21/2001	4866/5
Chromium, Total	21.1	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	2090.	mg/kg	03/22/2001	4866/6
Selenium, Total (ICP)	2.4	mg/kg	03/21/2001	4866/5
Silver, Total	4.2	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/23/2001	010323-1	MAG	6010B
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
TCLP Prep	03/20/2001	010320-1	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031199

Lab Number: 01031200
Sample Description: SB-4

Date Sampled: 03/13/2001
Time Sampled: 1145

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	6.8	mg/kg	03/21/2001	4866/5
Barium, Total	110.	mg/kg	03/21/2001	4866/5
Cadmium, Total	ND(0.3)	mg/kg	03/21/2001	4866/5
Chromium, Total	17.7	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	28.1	mg/kg	03/21/2001	4866/4
Mercury, Total Soil	ND(0.1)	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	ND(1.0)	mg/kg	03/21/2001	4866/5
Silver, Total	ND(1.0)	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B

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Lab Number: 01031200

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031200

Lab Number: 01031201
Sample Description: SB-2

Date Sampled: 03/13/2001
Time Sampled: 1130

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	8.0	mg/kg	03/21/2001	4866/5
Barium, Total	180.	mg/kg	03/21/2001	4866/5
Cadmium, Total	0.6	mg/kg	03/21/2001	4866/5
Chromium, Total	19.4	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	38.3	mg/kg	03/21/2001	4866/4
Mercury, Total Soil	ND(0.1)	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	ND(1.0)	mg/kg	03/21/2001	4866/5
Silver, Total	ND(1.0)	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031201

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LABORATORY REPORT

Client: Kansas Dept. of Health & Environment

Lab Number: 01031202
Sample Description: SB-3

Date Sampled: 03/13/2001
Time Sampled: 1135

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	5.7	mg/kg	03/21/2001	4866/5
Barium, Total	100.	mg/kg	03/21/2001	4866/5
Cadmium, Total	ND(0.6) M	mg/kg	03/21/2001	4866/5
Chromium, Total	13.5	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	15.7	mg/kg	03/21/2001	4866/4
Mercury, Total Soil	ND(0.1)	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	ND(1.0)	mg/kg	03/21/2001	4866/5
Silver, Total	ND(1.0)	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

M - Reporting limit higher than normal due to matrix interferences.

Conclusion of Lab Number: 01031202

Lab Number: 01031203
Sample Description: 614 Martin #4

Date Sampled: 03/05/2001
Time Sampled: 1650

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	0.36	mg/L	03/23/2001	4866/8
Arsenic, Total (ICP)	11.8	mg/kg	03/21/2001	4866/5
Barium, Total	120.	mg/kg	03/21/2001	4866/5
Cadmium, Total	25.8	mg/kg	03/21/2001	4866/5
Chromium, Total	14.1	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	843.	mg/kg	03/21/2001	4866/5
Selenium, Total (ICP)	1.0	mg/kg	03/22/2001	4866/6
Silver, Total	ND(1.0)	mg/kg	03/21/2001	4866/5

-Continued-

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CONTINENTAL ANALYTICAL SERVICES, INC.

LABORATORY REPORT

Client: Kansas Dept. of Health & Environment
Lab Number: 01031203
Sample Description: 614 Martin #4

Analysis	Concentration	Units	Date Analyzed	Book/Page

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/23/2001	010323-1	MAG	6010B
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
TCLP Prep	03/20/2001	010320-1	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031203

Lab Number: 01031204
Sample Description: 619 Martin #5

Date Sampled: 03/05/2001
Time Sampled: 1655

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	0.69	mg/L	03/23/2001	4866/8
Arsenic, Total (ICP)	16.0	mg/kg	03/21/2001	4866/5
Barium, Total	180.	mg/kg	03/21/2001	4866/5
Cadmium, Total	31.8	mg/kg	03/21/2001	4866/5
Chromium, Total	16.2	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	1750.	mg/kg	03/22/2001	4866/6
Mercury, Total Soil	0.7	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	2.0	mg/kg	03/21/2001	4866/5
Silver, Total	1.3	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/23/2001	010323-1	MAG	6010B
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A

-Continued-

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Client: Kansas Dept. of Health & Environment
Lab Number: 01031204

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
TCLP Prep	03/20/2001	010320-1	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031204

Lab Number: 01031205
Sample Description: Front Rrow #3

Date Sampled: 03/05/2001
Time Sampled: 1700

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	7.4	mg/kg	03/21/2001	4866/5
Barium, Total	160.	mg/kg	03/21/2001	4866/5
Cadmium, Total	1.6	mg/kg	03/21/2001	4866/5
Chromium, Total	22.9	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	65.0	mg/kg	03/21/2001	4866/4
Mercury, Total Soil	ND(0.1)	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	ND(1.0)	mg/kg	03/21/2001	4866/5
Silver, Total	ND(1.0)	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031205

-Continued-

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LABORATORY REPORT

Client: Kansas Dept. of Health & Environment

Lab Number: 01031206
Sample Description: 524 Front #4

Date Sampled: 03/05/2001
Time Sampled: 1340

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	15.2	mg/kg	03/21/2001	4866/5
Barium, Total	180.	mg/kg	03/21/2001	4866/5
Cadmium, Total	26.2	mg/kg	03/21/2001	4866/5
Chromium, Total	17.5	mg/kg	03/21/2001	4866/5
Lead, Total (ICP)	1450.	mg/kg	03/22/2001	4866/6
Mercury, Total Soil	0.4	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	1.4	mg/kg	03/21/2001	4866/5
Silver, Total	1.9	mg/kg	03/21/2001	4866/5

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Barium, Total	03/19/2001	010319-4	MAG	6010B
Cadmium, Total	03/19/2001	010319-4	MAG	6010B
Chromium, Total	03/19/2001	010319-4	MAG	6010B
Lead, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/19/2001	010319-4	MAG	6010B
Silver, Total	03/19/2001	010319-4	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031206

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations, Parts 136 or 141, or in EPA Publication, SW-846, 3rd edition, September, 1986 and the latest promulgated update. ND(), where noted, indicates none detected with the reporting limit in parentheses. Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker
Technical Manager

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Continental
Analytical Services, Inc.

COOLER / SAMPLE RECEIPT FORM

File No.: 5962
Order No.: 69509

Client Name: KDHE
Sample ID: SOOCOC

Date/Time cooler arrived: 3 / 16 / 01 11:40 By: CRR
Unpacked By: CRR Entered into LIMS by: CRR Date: 3 / 16 / 01

Cooler Identification: CAS Cooler #: _____ / Client's Cooler / Box / Letter / Hand Delivered
Other: _____

Cooler Size: Small / Medium / Large / NA

Delivered By: UPS/FedX/AirBrn/Pny Exp/Field S/Mail/Walk-In/Other _____
Air Bill Number: _____

Custody Seal: Present (Intact or Broken) Absent Seal No: _____
Seal Name: _____ Seal Date: _____
Seal matches Chain of Custody: Yes / No / NA

Type of Packing Material: Blue Ice/Ice/Bubble/Foam/Paper/Peanuts/Vermiculite/ NA 1 _____

Cooler Temperature (°C): 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Accidentally not taken
(Temperature includes correction factor.) Temp. By: Temp. Blank _____ Poured _____ Surface G P M
Thermo. ID No.: _____ Thermo. Correction Factor (°C): _____

Sample Receipt Discrepancies: ☒ No ☐ Yes (See detail below)

- ☐ Chain of Custody not present
  - ☐ Information obtained from:
    Purchase Order/Letter received with samples
- ☐ Container label absent
- ☐ Chain of Custody incomplete
  - ☐ Chain of Custody missing time sampled
    - ☐ Time sampled obtained from container label
  - ☐ Chain of Custody missing date sampled
    - ☐ Date sampled obtained from container label
  - ☐ Sample excluded from Chain of Custody: _____
- ☐ Broken or Leaking Containers: _____
- ☐ Sample listed on Chain of Custody, not received: _____
- ☐ Sample description on container label different from Chain of Custody: _____
- ☐ Air bubbles in VOA vials: _____

Detailed Description/Comments: _____

Did Project Manager contact client regarding cooler/sample receipt conditions: Yes / No
Who was contacted: Remarks:

Reviewed by Project Manager: MAM Date: 3 / 16 / 01

Continental Analytical Services, Inc.

Chain-of-Custody Record

CAS
Continental Analytical Services, Inc.
1804 Glendale • Salina, KS 67401
(785) 827-1273 • (800) 535-3076
FAX (785) 823-7830

PROJECT #:

PROJECT NAME: Cherryvale Yards

SAMPLED BY (SIGNATURE): [signature]

SAMPLED BY (PRINTED): Randy Brown

PARAMETERS

—SAMPLE INFORMATION—

DATE	TIME	C-COMP G-GRAB	FIELD FILTERED Y N	SAMPLE IDENTIFICATION	# OF CONTAINERS	RCRA Metals (6010+7471)	TCLP Lead 1311						REMARKS (REQUESTED TURNAROUND, PRESERVATIVE, ETC.)
03/05/01	1600	G		620 Martin 0-6"	1	X							Neal Results by 03/27/01
03/05/01	1130	G		Page 1 0-6"	1	X							
03/05/01	1145	G		Page 4 0-6"	1	X	X						
03/05/01	1500	G		520 Front #3 0-6"	1	X							
03/05/01	1430	G		Martin Alley #2 0-6"	1	X	X						
03/13/01	1145	G		SB-4 0-6"	1	X							
03/13/01	1130	G		SB-2 0-6"	1	X							
03/13/01	1135	G		SB 3 0-6"	1	X							
03/05/01	1650	G		619 Martin #4 0-6"	1	X	X						
03/05/01	1655	G		619 Martin #5 0-6"	1	X	X						

RELINQUISHED BY (SIGNATURE): [signature]	RELINQUISHED BY (PRINTED): Randolph L. Brown	DATE: 03/16/01 TIME: 0930	RECEIVED BY (SIGNATURE): [signature]	RECEIVED BY (PRINTED): John Cogan	DATE: 3/16/01 TIME: 0931
RELINQUISHED BY (SIGNATURE): [signature]	RELINQUISHED BY (PRINTED): John Cogan	DATE: 3/16/01 TIME: 1140	RECEIVED BY (SIGNATURE):	RECEIVED BY (PRINTED):	DATE: TIME:
RECEIVED AT LABORATORY BY (SIGNATURE/PRINTED): Chelsie Rupert		DATE: 3-16-01 TIME: 1140	SHIPPED VIA: Airbill #:	Seal #: Seal Date:	

REPORT TO:
Attention:
Address:
Phone #: FAX #:

INVOICE TO:
Attention: Purchase Order No.:
Address: CAS Price Quote No.:
Phone #: FAX #:

page ____ of ____

Chain-of-Custody Record

CAS
Continental Analytical Services, Inc.
1804 Glendale • Salina, KS 67401
(785) 827-1273 • (800) 535-3076
FAX (785) 823-7830

PROJECT #

PROJECT NAME

SAMPLED BY (SIGNATURE):

SAMPLED BY (PRINTED):

PARAMETERS

—SAMPLE INFORMATION—

DATE	TIME	C-COMP G-GRAB	FIELD FILTERED Y N	SAMPLE IDENTIFICATION	# OF CONTAINERS	RCRA Metals 6010+7471	TCLP Lead 1311						REMARKS (REQUESTED TURNAROUND, PRESERVATIVE, ETC.)
03/05/01	1700	6		Front Row #3 0-6"	1	X							Need Results by
03/05/01	1340	6		524 Front #4 0-6"	1	X	~~X~~ NOTCLP						03/27/01
					1		~~X~~ NOTCLP						
					1								

RELINQUISHED BY (SIGNATURE):	RELINQUISHED BY (PRINTED):	DATE: / TIME:	RECEIVED BY (SIGNATURE):	RECEIVED BY (PRINTED):	DATE: / TIME:
Randolph L Brown	Randolph L Brown	03/16/01 0930	John Crigan	John Crigan	3/16/01 0931
John Crigan	John Crigan	3/16/01 1140			
RECEIVED AT LABORATORY BY (SIGNATURE/PRINTED): Chelsie Rupert	Chelsie Rupert	3-16-01 1140	SHIPPED VIA: Airbill #:	Seal #: Seal Date:	

REPORT TO:

Attention:

Address:

Phone #: FAX #:

INVOICE TO:

Attention: Purchase Order No.:

Address: CAS Price Quote No.:

Phone #: FAX #:

Continental
Analytical Services, Inc.

04/02/2001

Kansas Dept. of Health & Environment
Attn: Randy Brown
740 Forbes Field
Topeka, KS 66620-0001

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ENVIRONMENTAL REMEDIATION

Date Received: 03/27/2001
Continental File No.: 5962
Continental Order No.: 69714
Project No.:
Your P.O.: 33322

Dear Mr. Brown:

This laboratory report consisting of 9 pages contains the analytical results for the following samples:

CAS LAB ID #	SAMPLE DESCRIPTION	SAMPLE TYPE	DATE SAMPLED
01031970	618 Front #2	Solid	03/15/2001
01031971	617 Front #2	Solid	03/15/2001
01031972	621 Front #2	Solid	03/15/2001
01031973	618 Front #1	Solid	03/15/2001
01031974	513 Front #3	Solid	03/15/2001
01031975	509 Front #4	Solid	03/15/2001
01031976	513 Front #2	Solid	03/15/2001
01031977	509 Front #3	Solid	03/15/2001
01031978	610 Front #1	Solid	03/15/2001
01031979	621 Front #1	Solid	03/15/2001

Thank you for choosing Continental for this project. If you have any questions, please contact me at (800)-535-3076.

CONTINENTAL ANALYTICAL SERVICES, INC.

Gregory J. Groene
Project Manager

1804 Glendale Road • Salina, Kansas 67401-6675
785-827-1273 • 800-535-3076 • FAX 785-823-7830
KDHE Environmental Laboratory Accreditation No. E-10146

International Association of Environmental Testing Laboratories
Ethics Service Quality
Seal of Excellence Program

Continental
Analytical Services, Inc.

Client: Kansas Dept. of Health & Environment
Attn: Randy Brown
740 Forbes Field
Topeka, KS 66620-0001

Date Sample Rptd: 04/02/2001
Date Sample Recd: 03/27/2001
Continental File No: 5962
Continental Order No: 69714
Client P.O.:

Lab Number: 01031970
Sample Description: 618 Front #2

Date Sampled: 03/15/2001
Time Sampled: 1430

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	2.21	mg/L	03/30/2001	4866/13
Arsenic, Total (ICP)	33.7	mg/kg	03/29/2001	4866/13
Barium, Total	240.	mg/kg	03/29/2001	4866/13
Cadmium, Total	55.8	mg/kg	03/29/2001	4866/13
Chromium, Total	19.3	mg/kg	03/29/2001	4866/13
Lead, Total (ICP)	3680.	mg/kg	04/01/2001	4866/14
Mercury, Total Soil	0.8	mg/kg	03/29/2001	4425/331
Selenium, Total (ICP)	3.5	mg/kg	03/29/2001	4866/13
Silver, Total	4.4	mg/kg	03/29/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/29/2001	010329-5	MAG	6010B
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-1	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
TCLP Prep	03/28/2001	010328-1	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031970

Lab Number: 01031971
Sample Description: 617 Front #2

Date Sampled: 03/15/2001
Time Sampled: 1150

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	21.8	mg/kg	03/29/2001	4866/13
Barium, Total	250.	mg/kg	03/29/2001	4866/13
Cadmium, Total	32.8	mg/kg	03/29/2001	4866/13
Chromium, Total	15.9	mg/kg	03/29/2001	4866/13

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785-827-1273 • 800-535-3076 • FAX 785-823-7830
KDHE Environmental Laboratory Accreditation No. E-10146

CONTINENTAL ANALYTICAL SERVICES, INC.

LABORATORY REPORT

Client: Kansas Dept. of Health & Environment
Lab Number: 01031971
Sample Description: 617 Front #2

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, Total (ICP)	1660.	mg/kg	04/01/2001	4866/14
Mercury, Total Soil	0.8	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	2.2	mg/kg	03/29/2001	4866/13
Silver, Total	3.4	mg/kg	03/29/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031971

Lab Number: 01031972
Sample Description: 621 Front #2

Date Sampled: 03/15/2001
Time Sampled: 1300

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	6.6	mg/kg	03/29/2001	4866/13
Barium, Total	160.	mg/kg	03/29/2001	4866/13
Cadmium, Total	5.4	mg/kg	03/29/2001	4866/13
Chromium, Total	21.7	mg/kg	03/29/2001	4866/13
Lead, Total (ICP)	152.	mg/kg	03/29/2001	4866/13
Mercury, Total Soil	ND(0.1)	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	ND(1.0)	mg/kg	03/29/2001	4866/13
Silver, Total	ND(1.0)	mg/kg	03/29/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B

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LABORATORY REPORT

Client: Kansas Dept. of Health & Environment
Lab Number: 01031972

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031972

Lab Number: 01031973
Sample Description: 618 Front #1

Date Sampled: 03/15/2001
Time Sampled: 1130

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	2.12	mg/L	03/30/2001	4866/13
Arsenic, Total (ICP)	31.3	mg/kg	03/29/2001	4866/13
Barium, Total	190.	mg/kg	03/29/2001	4866/13
Cadmium, Total	41.0	mg/kg	03/29/2001	4866/13
Chromium, Total	18.1	mg/kg	03/29/2001	4866/13
Lead, Total (ICP)	3190.	mg/kg	04/01/2001	4866/14
Mercury, Total Soil	0.7	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	4.1	mg/kg	03/29/2001	4866/13
Silver, Total	3.7	mg/kg	03/29/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/29/2001	010329-5	MAG	6010B
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
TCLP Prep	03/28/2001	010328-1	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031973

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LABORATORY REPORT

Client: Kansas Dept. of Health & Environment

Lab Number: 01031974
Sample Description: 513 Front #3

Date Sampled: 03/15/2001
Time Sampled: 1145

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	0.34	mg/L	03/30/2001	4866/13
Arsenic, Total (ICP)	12.4	mg/kg	03/29/2001	4866/13
Barium, Total	200.	mg/kg	03/29/2001	4866/13
Cadmium, Total	28.4	mg/kg	03/29/2001	4866/13
Chromium, Total	17.0	mg/kg	03/29/2001	4866/13
Lead, Total (ICP)	1110.	mg/kg	04/01/2001	4866/14
Mercury, Total Soil	0.5	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	2.1	mg/kg	03/29/2001	4866/13
Silver, Total	1.6	mg/kg	03/29/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/29/2001	010329-5	MAG	6010B
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
TCLP Prep	03/28/2001	010328-1	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031974

Lab Number: 01031975
Sample Description: 509 Front #4

Date Sampled: 03/15/2001
Time Sampled: 1310

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	17.9	mg/kg	03/29/2001	4866/13
Barium, Total	480.	mg/kg	03/29/2001	4866/13
Cadmium, Total	32.3	mg/kg	03/29/2001	4866/13
Chromium, Total	29.0	mg/kg	03/29/2001	4866/13
Lead, Total (ICP)	1710.	mg/kg	04/01/2001	4866/14
Mercury, Total Soil	0.6	mg/kg	03/31/2001	4425/332

-Continued-

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Continental
Analytical Services, Inc.

CONTINENTAL ANALYTICAL SERVICES, INC.

LABORATORY REPORT

Client: Kansas Dept. of Health & Environment
Lab Number: 01031975
Sample Description: 509 Front #4

Analysis	Concentration	Units	Date Analyzed	Book/Page
Selenium, Total (ICP)	2.8	mg/kg	03/29/2001	4866/13
Silver, Total	2.2	mg/kg	03/29/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031975

Lab Number: 01031976
Sample Description: 513 Front #2

Date Sampled: 03/15/2001
Time Sampled: 1400

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	6.4	mg/kg	03/30/2001	4866/13
Barium, Total	110.	mg/kg	03/30/2001	4866/13
Cadmium, Total	3.4	mg/kg	03/30/2001	4866/13
Chromium, Total	17.4	mg/kg	03/30/2001	4866/13
Lead, Total (ICP)	85.0	mg/kg	03/30/2001	4866/13
Mercury, Total Soil	ND(0.1)	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	ND(1.0)	mg/kg	03/30/2001	4866/13
Silver, Total	ND(1.0)	mg/kg	03/30/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B

-Continued-

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Client: Kansas Dept. of Health & Environment
Lab Number: 01031976

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Silver, Total	03/28/2001	010328-3	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031976

Lab Number: 01031977
Sample Description: 509 Front #3

Date Sampled: 03/15/2001
Time Sampled: 1330

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	7.6	mg/kg	03/30/2001	4866/13
Barium, Total	150.	mg/kg	03/30/2001	4866/13
Cadmium, Total	5.9	mg/kg	03/30/2001	4866/13
Chromium, Total	19.9	mg/kg	03/30/2001	4866/13
Lead, Total (ICP)	227.	mg/kg	03/30/2001	4866/13
Mercury, Total Soil	0.1	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	1.3	mg/kg	03/30/2001	4866/13
Silver, Total	ND(1.0)	mg/kg	03/30/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031977

Lab Number: 01031978
Sample Description: 610 Front #1

Date Sampled: 03/15/2001
Time Sampled: 1410

Analysis	Concentration	Units	Date Analyzed	Book/Page

-Continued-

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Client: Kansas Dept. of Health & Environment
Lab Number: 01031978
Sample Description: 610 Front #1

Analysis	Concentration	Units	Date Analyzed	Book/Page
Lead, TCLP	4.97	mg/L	03/30/2001	4866/13
Arsenic, Total (ICP)	26.8	mg/kg	03/30/2001	4866/13
Barium, Total	160.	mg/kg	03/30/2001	4866/13
Cadmium, Total	121.	mg/kg	03/30/2001	4866/13
Chromium, Total	15.3	mg/kg	03/30/2001	4866/13
Lead, Total (ICP)	1540.	mg/kg	04/01/2001	4866/14
Mercury, Total Soil	1.0	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	4.1	mg/kg	03/30/2001	4866/13
Silver, Total	2.3	mg/kg	03/30/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Lead, TCLP	03/29/2001	010329-6	MAG	6010B
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
TCLP Prep	03/28/2001	010328-2	KNH	1311
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A
ICP Metals TCLP Preparation Analyst/Method			SKR	3010A

Conclusion of Lab Number: 01031978

Lab Number: 01031979
Sample Description: 621 Front #1

Date Sampled: 03/15/2001
Time Sampled: 1350

Analysis	Concentration	Units	Date Analyzed	Book/Page
Arsenic, Total (ICP)	12.1	mg/kg	03/30/2001	4866/13
Barium, Total	150.	mg/kg	03/30/2001	4866/13
Cadmium, Total	23.3	mg/kg	03/30/2001	4866/13
Chromium, Total	16.6	mg/kg	03/30/2001	4866/13
Lead, Total (ICP)	764.	mg/kg	03/30/2001	4866/13
Mercury, Total Soil	0.2	mg/kg	03/31/2001	4425/332
Selenium, Total (ICP)	1.4	mg/kg	03/30/2001	4866/13
Silver, Total	ND(1.0)	mg/kg	03/30/2001	4866/13

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Arsenic, Total (ICP)	03/28/2001	010328-3	MAG	6010B

-Continued-

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LABORATORY REPORT

Client: Kansas Dept. of Health & Environment
Lab Number: 01031979

Analysis	Date Prepared	QC Batch	Analyst	Method(s)
Barium, Total	03/28/2001	010328-3	MAG	6010B
Cadmium, Total	03/28/2001	010328-3	MAG	6010B
Chromium, Total	03/28/2001	010328-3	MAG	6010B
Lead, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Mercury, Total Soil	03/28/2001	010328-2	AMB	7471A
Selenium, Total (ICP)	03/28/2001	010328-3	MAG	6010B
Silver, Total	03/28/2001	010328-3	MAG	6010B
ICP Metals Total Preparation Analyst/Method			SKR	3050B
Mercury Total Preparation Analyst/Method			AMB	7471A

Conclusion of Lab Number: 01031979

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations, Parts 136 or 141, or in EPA Publication, SW-846, 3rd edition, September, 1986 and the latest promulgated update. ND(), where noted, indicates none detected with the reporting limit in parentheses. Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker
Technical Manager

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Continental
Analytical Services, Inc.

COOLER / SAMPLE RECEIPT FORM

File No.: 5962
Order No.: 69714

Client Name: KDHE
Sample ID: See COC

Date/Time cooler arrived: 3/27/01 14:20 By: mam
Unpacked By: mam Entered into LIMS by: CCR Date: 3/27/01

Cooler Identification: CAS Cooler #: _____ / Client's Cooler/Box/Letter/Hand Delivered
Other: _____

Cooler Size: Small / Medium / Large / NA

Delivered By: UPS/FedX/AirBrn/Pny Exp/Field S/Mail/Walk-In/Other _____
Air Bill Number: _____

Custody Seal: Present (Intact or Broken) Absent Seal No: _____
Seal Name: _____ Seal Date: _____
Seal matches Chain of Custody: Yes / No / NA

Type of Packing Material: Blue Ice/Ice/Bubble/Foam/Paper/Peanuts/Vermiculite/ NA _____

Cooler Temperature (°C): 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ 22
(Temperature includes correction factor.) Temp. By: Temp. Blank_____ Poured _____ Surface G P M
Thermo. ID No.: 154 Thermo. Correction Factor (°C): 1

Sample Receipt Discrepancies: ☒ No ☐ Yes (See detail below)

- ☐ Chain of Custody not present
  - ☐ Information obtained from:
    Purchase Order/Letter received with samples
- ☐ Container label absent
- ☐ Chain of Custody incomplete
  - ☐ Chain of Custody missing time sampled
    - ☐ Time sampled obtained from container label
  - ☐ Chain of Custody missing date sampled
    - ☐ Date sampled obtained from container label
  - ☐ Sample excluded from Chain of Custody: _____
- ☐ Broken or Leaking Containers: _____
- ☐ Sample listed on Chain of Custody, not received: _____
- ☐ Sample description on container label different from Chain of Custody: _____
- ☐ Air bubbles in VOA vials: _____

Detailed Description/Comments: _____

Did Project Manager contact client regarding cooler/sample receipt conditions: Yes / No
Who was contacted: Remarks:

Reviewed by Project Manager: mam Date: 3/27/01

Continental Analytical Services, Inc.

Chain-of-Custody Record

CAS
Continental Analytical Services, Inc.
1804 Glendale • Salina, KS 67401
(785) 827-1273 • (800) 535-3076
FAX (785) 823-7830

PROJECT #:

PROJECT NAME: Cherryvale Yards

SAMPLED BY (SIGNATURE): [signature]

SAMPLED BY (PRINTED): PETER HAXTON

PARAMETERS

SAMPLE INFORMATION					# OF CONTAINERS	RLRAmerals 6010	Mercury 7471	TCLP Lead 1311					REMARKS (REQUESTED TURNAROUND, PRESERVATIVE, ETC.)
DATE	TIME	C-COMP G-GRAB	FIELD FILTERED Y N	SAMPLE IDENTIFICATION									
03/15/01	1430	G		618 Front #2 0-6"	1	X	X	X					Analysis needs to be run by 3/30/01 except TCLP on 621 Front #1
03/15/01	1150	G		617 Front #2 0-6"	1	X	X						
03/15/01	1300	G		621 Front #2 0-6"	1	X	X						
03/15/01	1130	G		618 Front #1 0-6"	1	X	X	X					
03/15/01	1145	G		513 Front #3 0-6"	1	X	X	X					
03/15/01	1310	G		509 Front #4 0-6"	1	X	X						
03/15/01	1400	G		513 Front #2 0-6"	1	X	X						
03/15/01	1330	G		509 Front #3 0-6"	1	X	X						
03/15/01	1410	G		610 Front #1 0-6"	1	X	X	X					
03/15/01	1350	G		621 Front #1 0-6"	1	X	X	X					Hold for TCLP!

RELINQUISHED BY (SIGNATURE): [signature] RELINQUISHED BY (PRINTED): PETER HAXTON DATE: 3/27/01 TIME: 1420

RECEIVED BY (SIGNATURE): RECEIVED BY (PRINTED): DATE: TIME:

RELINQUISHED BY (SIGNATURE): RELINQUISHED BY (PRINTED): DATE: TIME:

RECEIVED BY (SIGNATURE): RECEIVED BY (PRINTED): DATE: TIME:

RECEIVED AT LABORATORY BY (SIGNATURE/PRINTED): Melisa McElwee Melisa McElwee DATE: 3/27/01 TIME: 1420

SHIPPED VIA: Airbill #: Seal #: Seal Date:

REPORT TO: KDHE
Attention: RANDY BROWN
Address: FORBES FLD BLDG 740 TOPEKA, KS 66620
Phone #: 785-296-8065 FAX #:

INVOICE TO: KDHE/BER
Attention: KATHY LEWIS
Address: SAME
Phone #: FAX #:
Purchase Order No.:
CAS Price Quote No.:

DIVISION OF HEALTH & ENVIRONMENTAL LABORATORIES

Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

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INORGANIC CHEMISTRY

Report To: Bureau of Env. Remediation
Forbes Field, Bldg. 740
Attn: Randy Brown
Topeka KS 66620

Lab Number: 101310PT

Site ID: 4EM80
Account Code: EP

Collection Location: C306371097 Cherryvale Rinsate

Collector: Randy Brown-BER
Matrix: Water
Collect Depth:
Date/Time Collected: 03/06/01 14:30
Date/Time Received: 03/08/01 11:22

Sample Comments:

Parameter		Analytical Result	Units	Analysis Date	Analytical Method
Aluminum		0.258	mg/L	03/14/01	EPA 200.7
Antimony	<	0.050	mg/L	03/14/01	EPA 200.7
Arsenic	<	0.050	mg/L	03/14/01	EPA 200.7
Barium	<	0.005	mg/L	03/14/01	EPA 200.7
Beryllium	<	0.001	mg/L	03/14/01	EPA 200.7
Boron	<	0.010	mg/L	03/14/01	EPA 200.7
Cadmium	<	0.005	mg/L	03/14/01	EPA 200.7
Calcium		4.65	mg/L	03/14/01	EPA 200.7
Chromium	<	0.010	mg/L	03/14/01	EPA 200.7
Cobalt	<	0.010	mg/L	03/14/01	EPA 200.7
Copper	<	0.010	mg/L	03/14/01	EPA 200.7
Iron		0.234	mg/L	03/14/01	EPA 200.7
Lead	<	0.050	mg/L	03/14/01	EPA 200.7
Magnesium		0.13	mg/L	03/14/01	EPA 200.7
Manganese		0.019	mg/L	03/14/01	EPA 200.7
Mercury	<	0.0005	mg/L	03/09/01	EPA 245.2
Molybdenum	<	0.020	mg/L	03/14/01	EPA 200.7
Nickel	<	0.005	mg/L	03/14/01	EPA 200.7
Potassium		0.12	mg/L	03/14/01	EPA 200.7
Selenium	<	0.050	mg/L	03/14/01	EPA 200.7
Silica		0.782	mg/L	03/14/01	EPA 200.7
Silver	<	0.010	mg/L	03/14/01	EPA 200.7
Sodium		0.16	mg/L	03/14/01	EPA 200.7
Thallium	<	0.050	mg/L	03/14/01	EPA 200.7
Vanadium	<	0.005	mg/L	03/14/01	EPA 200.7
Zinc		0.391	mg/L	03/14/01	EPA 200.7

Reporting Analyst: REH
Date Reported: 03/16/01

< - Not Detected at Indicated Level
* - Holding Time Exceeded

Copies To: File

ATTACHMENT D

FIELD X-RAY FLUORESCENCE (XRF) ANALYTICAL FIELD SHEETS

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/05/01 Site Name: Cherryvale Yards Operator Name: R Braun

System Check, Warm-Up and Internal Calibration Notes:
On 1620 Res 399 eV SsSmci
3 X bag XRF analysis Wet samples (not dried)

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged

If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Bags not dried, samples bagged in 1-QT ziploc marked bags

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Cal	538				Cal
High Std	539	Cd-109	62	5090 ± 160	
" "	540	Am-241	62		Cd < 73.0
Page 1	541	Am-241	62		Cd < 57.0 Samples obtained 0-6"
Page 1	542	Cd-109	62	333 ± 30	
Page 1	543	Cd-109	61	485 ± 37	
Page 1	544	Am-241	63		Cd < 47.0
Page 1	545	Am-241	62		Cd < 49.0
Page 1	546	Cd-109	61	543 ± 38.0	
Page 2	547	Cd-109	61	397 ± 31	~~Cd < 53.0~~
Page 2	548	Am-241	63		Cd < 53.0
Page 2	549	Am-241	62		Cd < 49.0
Page 2	550	Cd-109	61	496 ± 39	
Page 2	551	Cd-109		420 ± 42	
Page 2	552	Am-241			Cd < 51.0 Am-241 Dropped
Page 3	553	Cd-109	62	450 ± 38	
Page 3	554	Cd-109	62	615 ± 45	
Page 3	555	Cd-109	62	388 ± 38	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/05/01 Site Name: Cherryvale Yards Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
3X bag XRF analysis Samples not dried (wet samples)

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples bagged in 1-qt marked zip-lock freezer bags

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Page 4	556	Cd-109	62	474±38	Samples obtained 0-6"
Page 4	557	Cd-109	62	463±36	
Page 4	558	Cd-109	62	412±35	
Page 5	559	Cd-109	62	415±36	
Page 5	560	Cd-109	62	548±42	
Page 5	561	Cd-109	62	606±45	
High STD	562	Cd-109	65	5010±150	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/06/01 AM Site Name: Cherryvale Residential Yards Site Operator Name: R.L. Brown

System Check, Warm-Up and Internal Calibration Notes:
On 1048 Cal 1117 Res 3.96 ev Ss 5.0x
Wet samples 3X bag analysis

Method 6200 Utilized? Y X N __ In-situ readings? Y ~~X~~ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
bagged samples in marked 1qt freezer bags

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Med Std	564	Cd-109	62	1000 ± 60	
Martin #1	565	Cd-109	31	405 ± 46	All samples 0-6"
Martin #1	566	Cd-109	31	505 ± 56	
Martin #1	567	Cd-109	31	284 ± 47	
W Martin #2	568	Cd-109	31	430 ± 50	
W Martin #2	569	Cd-109	31	468 ± 49	Field Dup
W Martin #2	570	Cd-109	31	585 ± 69	
W Martin #2	571	Cd-109	31	573 ± 64	
W Martin #3	572	Cd-109	31	473 ± 56	
W Martin #3	573	Cd-109	34	823 ± 72	
W Martin #3	574	Cd-109	31	705 ± 67	
620 W Martin #1	575	Cd-109	31	50.9 ± 19.0	
620 W Martin #2	576	Cd-109	31	86.4 ± 27	
620 W Martin	577	Cd-109	31	113 ± 30	
~~Martin~~ Front RR 1	578	Cd-109	31	107 ± 31	
~~Martin~~ Front RR 1	579	Cd-109	31	58.1 ± 30	
~~Martin~~ Front RR 1	580	Cd-109	31	87.2 ± 28	
~~Martin~~ Front RR 2	581	Cd-109	32	179 ± 45	

Page ___ of 2

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/06/01 Site Name: Cherryvale Residential Yards Operator Name: R.L. Brown

System Check, Warm-Up and Internal Calibration Notes:
OA, M All samples (field samples) 0-6" 3X bag analysis
Wet Samples

Method 6200 Utilized? Y X N __ In-situ readings? Y ~~X~~ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
bagged samples in marked lgt tree or bags

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
~~Mar~~					
~~Martin~~ Front RR#2	582	Cd-109	34	191±37	0-6"
~~Martin~~ Front RR2	583	Cd-109	31	189±37	
~~Martin~~ Front RR 2	584	Cd-109	31	198±40	
~~Martin RR2~~	~~585~~				
536 ~~Martin~~ Front	585	Cd-109	31	134±31	
536 ~~Martin~~ Front	586	Cd-109	31	161±37	
536 ~~Martin~~ Front	587	Cd-109	31	144±34	
524 ~~Martin~~ Front	588	Cd-109	49	176±28	
524 Front	589	Cd-109	31	180±38	
524 Front	590	Cd-109	31	196±43	
Front #3 (504)	591	Cd-109	31	144±38	
Front #3 (504)	592	Cd-109	31	88.8±29	
Front #3 (504)	593	Cd-109	31	110±33	
Med STD	594	Cd-109	62	1050±61	Y
Med STD	595	Cd-109	62	1020±61	Field Dup
Med STD	596	Cd-109	31	1020±86	Field Dup @ 3 Sec
					OFF 1220

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 05/06/01 P.M. Site Name: Cherryvale Res Yards Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
On 1330 Cal 1347 Res 30 SeV Source Strength 5 mCi
Wet samples 3X bag analysis

Method 6200 Utilized? Y X N ___ In-situ readings? Y X N X bagged samples

If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
bagged samples in 1 qt ziploc freezer bags, parked

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
High STD	598	Cd-109	62	5050 ± 160	
Page 6	599	Cd-109	34	447 ± 49	All samples obtained
Page 6	600	Cd-109	34	586 ± 53	0-6"
Page 6	601	Cd-109	34	654 ± 57	
Page 7	602	Cd-109	31	275 ± 35	
Page 7	603	Cd-109	31	434 ± 46	
Page 7	604	Cd-109	31	328 ± 38	
Martin Alley #2	605	Cd-109	31	1070 ± 97	
Martin Alley #2	606	Cd-109	31	1070 ± 100	
Martin Alley #2	607	Cd-109	31	1040 ± 89	Field Dup
Martin Alley #2	608	Cd-109	31	1330 ± 96	
Martin Alley 1	609	Cd-109	31	360 ± 47	
Martin Alley 1	610	Cd-109	31	640 ± 64	
Martin Alley 1	611	Cd-109	32	542 ± 66	
Martin Alley 3	612	Cd-109	30	1430 ± 99	
Martin Alley 3	~~613~~ 614	Cd-109	33	1630 ± 100	613 Null
Martin Alley 3	615	Cd-109	33	1520 ± 90	
524 Front #2	616	Cd-109	31	1090 ± 85	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/06/01 P.m. Site Name: Cherryvale Residential Yards Site Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
Wet samples 3x bag analysis

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples bagged in marked lgt freezer bags (Zip-loc)

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
524 Front #2	617	Cd-109	31	506±48	0-6" Sample Depth
524 Front #2	618	Cd-109	30	470±45	
524 Front #3	619	Cd-109	37	734±56	
524 Front #3	620	Cd-109	31	409±45	
524 Front #3	621	Cd-109	31	1000±80	
520 Front #1	622	Cd-109	41	647±52	
520 Front #1	623	Cd-109	31	611±61	
520 Front #1	624	Cd-109	31	456±56	
524 Front #4	625	Cd-109	34	666±94	
524 Front #4	626	Cd-109	31	966±69	
524 Front #4	627	Cd-109	31	618±50	
Schools Alley	628	Cd-109	32	361±56	
Schools Alley	629	Cd-109	32	300±43	
Schools Alley	630	Cd-109	32	334±47	
520 Front #4	631	Cd-109	34	859±75	
520 Front #4	632	Cd-109	34	251±36	
520 Front #4	633	Cd-109	37	1661±74	
520 Front #4	634	Cd-109	34	994±75	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/04/01 P.M. Site Name: Cherryvale Residential Yards Site Operator Name: R.L. Brown

System Check, Warm-Up and Internal Calibration Notes:
Wet samples 3X bag analysis

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples bagged in marked 1-qt zip-loc freezer bags

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
520 Front #3	635	Cd-109	31	442±55	0-6" Sample dipping
520 Front #3	636	Cd-109	31	460±54	
520 Front #3	637	Cd-109	41	630±52	
Martin #1	638	Cd-109	31	702±75	
Martin #1	639	Cd-109	34	563±61	
Martin #1	640	Cd-109	33	1070±88	
Martin #2	641	Cd-109	33	1010±84	
Martin #2	642	Cd-109	33	1280±41	
Martin #2	643	Cd-109	33	944±81	
Coyle #1	644	Cd-109	31	310±42	
Coyle #1	645	Cd-109	31	254±42	
Coyle #1	646	Cd-109	31	249±41	
Coyle #1	647	Cd-109	34	233±37	Field Dup
Coyle #3	648	Cd-109	31	160±37	
Coyle #3	649	Cd-109	32	104±33	
Coyle #3	650	Cd-109	32	174±42	
Coyle #2	651	Cd-109	31	360±55	
Coyle #2	652	Cd-109	35	310±49	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/06/01 P.M. Site Name: Cherryvale Residential Yards Site Operator Name: R.L. Brown

System Check, Warm-Up and Internal Calibration Notes:
Wet Samples 3X bag analysis with XRF

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples bagged in 1qt-Zip-loc freezer bag sprayed

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Coyle #2	653	Cd-109	81	318±33	0-6" Sample Depth
619 Martin #6	654	Cd-109	31	337±42	
619 Martin #6					Nil Slipped
619 Martin #6	657	Cd-109	39	279±37	
619 Martin #6	658	Cd-109	32	291±49	
619 Martin #5	659	Cd-109	35	834±79	
619 Martin #5	660	Cd-109	41	1,300±74	
619 Martin #5	661	Cd-109	31	877±88	
619 Martin #4	662	Cd-109	31	593±57	
619 Martin #4	663	Cd-109	31	593±54	
619 Martin #4	664	Cd-109	37	718±55	
High STD	665	Cd-109	62	5030±160	
High STD	666	Cd-109	62	5020±150	Field Dup
High STD	667	Cd-109	36	4860±200	Field Dup 30ss
					Off 1645

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/08/09 Site Name: Cherryvale Residential Yards Site Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
On 0753 Cal 0815 Res 347 cd 5 & 5 inci Dried
All samples obtained 0-6" 3X bags XRF analysis

Method 6200 Utilized? Y __ N __ In-situ readings? Y __ N __

If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples Dried 48-72 hrs @ 60°C Lab convection oven

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Med STD	669	Cd-109	62	1060±62	
Page 1	670	Cd-109	34	610±63	
Page 1	671	Cd-109	31	484±65	
Page 1	672	Cd-109	34	602±67	Lab sample
Page 2	673	Cd-109	35	316±50	
Page 2	674	Cd-109	31	562±73	
Page 2	675	Cd-109	31	479±67	
Page 3	676	Cd-109	34	714±70	
Page 3	677	Cd-109	30	461±56	
Page 3	678	Cd-109	34	442±49	
Page 3	679	Cd-109	40	416±42	Field Dup
Page 4	680	Cd-109	34	460±53	
Page 4	681	Cd-109	31	523±64	
Page 4	682	Cd-109	35	482±59	Lab Sample
Page 5	683	Cd-109	34	556±56	
Page 5	684	Cd-109	31	493±54	
Page 5	685	Cd-109	31	656±68	
Page 5	686	Cd-109	34	618±62	Field Dup

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/08/01 Site Name: Cherryvale Residential Yards Site Operator Name: R. Brown

System Check, Warm-Up and Internal Calibration Notes:
3X bag analysis All Samples trained 0 to 6"

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples dried 48-72 hrs @ 60°C lab conversion rain

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Coyle #3	687	Cd-109	31	169±41	
Coyle #3	688	Cd-109	42	212±34	
Coyle #3	689	Cd-109	31	134±38	
Med STD	690	Cd-109	100	996±47	
off 1021					

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/15/01 Site Name: Cherryvale Residential Yards Site Operator Name: RBrown

System Check, Warm-Up and Internal Calibration Notes:
On 1202 Warm up 1238 Res 406 eV Ss 5 mci
0-6" Sample depth Dried Samples 3x bag analysis
Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Dried 72 hrs @ 60°C Lab convection oven

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
High STD		Cd-109	62	5120±160	
Martin Alley #2		Cd-109	34	1480±110	0-6"
Martin Alley #2		Cd-109	33	2270±140	
Martin Alley #2			35	1190±130	Lab Sample
536 Martin			35	142±39	
" "			35	183±43	
" "			35	155±41	
School S Alley			32	577±82	
" " "			35	~~632±75~~	Rejected
" " "			35	383±70	
			35	396±77	
Martin #2			33	938±94	
" "			33	1370±120	
" "			35	800±90	
Martin RROW W School #2			34	268±57	
" "			34	303±55	
" "			34	247±47	
" "	"			~~[illegible]~~	~~Field Dup~~

41 273±44 Field Dup

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/15/01 Site Name: Cherryvale Residential Yards Site Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
3X bag analysis Dried Sample depth 0-6"

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X Bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Dried 72 hrs @ 60°C Lab convection oven

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
S24 Martin #1		Cd-109	31	282±55	0-6"
" " "			34	213±55	
" " "			34	204±45	
Page 7			34	800±78	
" "			34	864±80	
" "			34	740±74	
" "			34	757±74	Field Dup
W Martin #1			34	431±53	
W Martin #1			35	275±46	
" "			34	524±53	
S20 Front #5			34	1180±100	
" "			35	850±100	
" "			34	544±77	
Coyle #1			38	415±59	
" "			34	454±61	
" "			38	362±53	
W Martin #3			30	843±88	
" " "			34	969±87	
" " "			34	816±140	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/15/01 Site Name: Cherryvale Residential Yards Site Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
Dried Samples 3X analysis Sample depth 0-6"

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X Bagged Samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Dried 72 hrs @ 60°C Lab convection oven

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
High STD		Ld-104	62	5190±160	
524 Front #4			34	1190±94	0-6"
" " "			34	1210±90	
" " "			34	1300±110	
Coyle #2			31	350±73	
" "			40	431±61	
" "			34	332±66	
520 Front #1			34	722±77	
" " "			34	711±81	
" " "			34	685±73	
524 Front #2			35	725±98	
" " "			34	968±85	
" " "			34	1360±110	
620 Marvin			34	188±43	Lab Sample
" "			35	972±38	
" "			34	128±38	
520 Front #3			34	930±63	Lab Sample
" " "			34	914±84	
" " "			34	1050±87	
			44	1090±82	Field Dup

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/15/01 Site Name: Cherryvale Residential Yards Site Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
Samples dried 0-6" sample depth 3x bag analysis

Method 6200 Utilized? Y X N ___ In-situ readings? Y ___ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Dried 72 hrs @ 68°C in Lab convection oven

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
520 Front #2		Co-704	35	224±60	0-6"
" " "			44	664±66	
" " "			31	357±63	
Martin Alley #1			35	735±84	
" " "			34	764±74	
" " "			35	676±95	
524 Front #3			34	1120±91	Lab sample
" " "			34	894.0±80	
" " "			34	1000±93	
Martin Rear w/ church #1			34	105±36	
" " "			31	153±51	
" " "			38	62.1±34	
#6			33	781±87	
"			37	821±74	
"			35	621±73	
Martin #1			33	887±84	
Martin #1			33	986±99	
Martin #1		↓	34	795±81	

High STD 62 5180±160
Off

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/16/01 Site Name: Cherryvale Residential Yards Site Operator Name: _____

System Check, Warm-Up and Internal Calibration Notes:
On 0816 Cal 0832 Pe, 402eV Ss Smci
Samples dried 3x bag analysis

Method 6200 Utilized? Y X N__ In-situ readings? Y __ N X Bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Med STD		Cdrod	62	1030±61	
Page 6			34	630±59	
Page 6			34	576±59	
Page 6			37	737±65	
619 Martin #5			34	1240±86	Lab Sample
619 Martin #5			34	1350±94	
619 Martin #5			34	1230±90	
619 Martin #4			38	670±57	Lab Sample
" " "			34	712±65	
" " "			34	736±65	
Martin Alley #3			37	1590±110	
" " "			33	1720±120	
" " "			33	1650±130	
Front Row E School #3			35	94±35	
" "	"		34	204±41	
" "	"		31	117±35	
W Martin #2			35	410±61	
" " "			35	386±68	
" " "			34	493±50	
" " "			34	474±49	Field Dup
Med STD			62	1020±61	Med STD off 1110

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KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/20/01 Site Name: Cherryvale Residential Yards Site Operator Name: R. Brown

System Check, Warm-Up and Internal Calibration Notes:
In 1235 Cal 1307 Res 406 eV Ss Spec
Wet (undried) Samples 3x bag analysis

Method 6200 Utilized? Y X N ___ In-situ readings? Y ___ N X bagged samples

If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples obtained @ 61, in zip-lock lg+ freezer bags, marked

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
Med Std	692	Cd-109	62	1050±61	
610 Front #1	693	Cd-109	34	804±71	0-61
610 Front #1	694	Cd-109	37	818±68	
610 Front #1	695	Cd-109	33	913±74	
610 Front #2	696	Cd-109	31	488±61	
610 Front #2	697	Cd-109	34	319±35	
610 Front #2	698	Cd-109	35	317±34	
618 Front #1	699	Cd-109	34	2050±100	
618 Front #1	700	Cd-109	34	1240±74	
618 Front #1	701	Cd-109	33	2460±110	
618 Front #2	702	Cd-109	33	1780±94	
618 Front #2	703	Cd-109	33	1790±93	
618 Front #2	704	Cd-109	33	1850±97	
618 Front #3	705	Cd-109	31	77±27	
618 Front #3	706	Cd-109	31	81.5±25	
618 Front #3	707	Cd-109	31	1150±82	Tr. brick + slag
618 Front #3	708	Cd-109	38	1100±73	Field Dup
618 Front #3	708	Cd-109	31	1047±26	4pt

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/20/01 Site Name: Cherryvale Residential Yards Operator Name: R. L. Brown

System Check, Warm-Up and Internal Calibration Notes:
Wet (undried) Samples 3X Dup analysis

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples obtained 0-6", in marked lg ziplock freezer bags

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
617 Front #1	710	Cd-109	37	1150±65	0-6"
617 Front #1	711	Cd-109	34	1280±84	
617 Front #1	712	Cd-109	33	1330±76	
617 Front #1D	713	Cd-109	34	724±51	
617 Front #1D	714	Cd-109	34	837±60	
617 Front #2	715	Cd-109	31	861±73	
621 Front #1	716	Cd-109	31	435±47	
621 Front #1	717	Cd-109	41	416±40	
621 Front #1	718	Cd-109	42	365±41	
621 Front #2	719	Cd-109	34	49.3±21	
621 Front #2	720	Cd-109	35	142±31	
621 Front #2	721	Cd-109	35	124±24	
617 Front #4	723	Cd-109	38	495±51	
617 Front #4	724	Cd-109	35	512±52	
617 Front #4	725	Cd-109	31	766±66	
617 Front #3	726	Cd-109	31	523±55	
617 Front #3	727	Cd-109	31	637±67	
617 Front #3	728	Cd-109	31	740±81	

SB-2 1130 1X 40Z SB-3 1135 1X 40Z
SB-4 1145

03/20/01 Samples wet (undried) 0-6", marked
lat tip-loc bags Ran out of XRF forms!

I.D.	XL	Source	Run. Time	Lead (mg/kg)	Comments
617 Front #5	729	Cd-109	37	1530 ± 90	
	730	Cd-109	34	2000 ± 100	
	731	Cd-109	31	867 ± 76	
617 Front #6	732	Cd-109	31	938 ± 60	
	733	Cd-109	31	812 ± 66	
	734	Cd-109	31		
	735	Cd-109	34	971 ± 68	
	736	Cd-109	31	800 ± 65	
513 Front #2	737	Cd-109	32	751 ± 29	
	738	Cd-109	35	113 ± 30	
	739	Cd-109	32	51 ± 25	
513 Front #1	740	Cd-109	63	485 ± 35	
	741	Cd-109	34	472 ± 49	
	742	Cd-109	39	426 ± 53	
509 Front #1	744	Cd-109	31	723 ± 41	
	745	Cd-109	32	413 ± 37	
	746	Cd-109	34	506 ± 51	
509 Front #2	747	Cd-109	31	542 ± 57	
	748	Cd-109	31	757 ± 75	
	749	Cd-109	31	595 ± 60	
513 Front #4	750	Cd-109	31	247 ± 45	75 in Null
	752	Cd-109	31	276 ± 45	
	753	Cd-109	31	254 ± 40	

3 of 4

SampleID	XL	Source	RunTime	Lead	Comments
Seq Front #5	NR	Cd-109	31	295±45	
	"	Cd-109	31	257±42	
	"	Cd-109	35	349±49	
S15 Front #3	"	Cd-109	34	834±62	
	"	Cd-109	34	526±44	
	"	Cd-109	38	513±50	
S13 Front #5	"	Cd-109	31	271±44	
	"	Cd-109	31	327±46	
	"	Cd-109	35	324±37	
S09 Front #4					
Med STD		Cd-109	65	1020±59	

OFF

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/27/01 Site Name: Cherryvale Residential Yards Site Operator Name: RBrown

System Check, Warm-Up and Internal Calibration Notes:
On 832 Cal 1001 Res 401 SS Smo: 3X bag analysis

Method 6200 Utilized? Y__ N__ In-situ readings? Y__ N ✓ bagged
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Dried 72hrs @ 60°C in Lab convection oven 0-6" sample depth

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
High STD		Cd-109	85	5040±130	0-6" Sample Depth
S13 Front #5			34	414±59	
" "			35	375±61	
" "			35	427±58	
S13 Front #4			31	196±34	
" " "			31	297±54	
" " "			31	334±57	
617 Front #1			33	2700±150	
" " "			31	1370±140	
" " "			33	1890±120	
509 Front #1			31	752±84	
" " "			31	842±81	
" " "			31	986±91	
617 Front #2			34	2840±160	Lab Sample ✓
" " "			34	1640±110	
" " "			34	1520±110	
Dup			34	1410±110	Field Dup

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/27/01 Site Name: Cherryvale Residential Yards Site Operator Name: RBrown

System Check, Warm-Up and Internal Calibration Notes:
Samples dried 3X bags analysis Dried in lab convection oven

Method 6200 Utilized? Y X N ___ In-situ readings? Y ___ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Dried 72 hrs @ 60°C Samples obtained from 0-6"

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
621 Front #2		Cdyd	31	961 ± 34	Lab Sample
" " "			32	128 ± 37	
" " "			37	187 ± 38	
610 Front #7			34	773 ± 77	
" " "			34	817 ± 78	
" " "			34	1030 ± 99	
617 Front #6			34	1650 ± 110	
" " "			31	1290 ± 100	
" " "			31	1450 ± 120	
618 Front #3			31	123 ± 35	
" " "			36	183 ± 40	
" " "			31	127 ± 38	
621 Front #1			31	646 ± 74	Lab Sample
" " "			31	587 ± 73	
" " "			34	678 ± 62	
618 Front #2			33	2190 ± 130	Lab Sample
" " "			31	2200 ± 190	
" " "			34	2440 ± 150	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/27/07 Site Name: Cherryvale Residential Yards Site Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
Samples dried 3x bag analysis lab convection oven used to dry

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X

If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Dried 72hrs @ 60°C Samples obtained from 0-6"

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
509 Front #4		Cd-109	34	1430±110	Lab Sample ✓
" " "			44	1260±83	
" " "			34	1540±110	
618 Front #1			33	3670±170	Lab Sample ✓
" " "			33	1830±86	
" " "			34	2690±160	
509 Front #3			31	298±46	Lab Sample ✓
" " "			31	237±44	
" " "			31	254±47	
513 Front #1			31	365±55	
" " "			31	1040±85	
" " "			31	682±72	
509 Front #5			31	456±61	
" " "			31	354±54	
" " "			31	358±59	
617 front #5			31	1170±95	
" " "			34	1690±110	
" " "			31	1400±110	
Dup			34	1320±110	

KDHE/Bureau of Environmental Remediation
Site Assessment Program
Niton 733 X-Ray Fluorescence (XRF) Soil Analysis Field Data Sheets

Date: 03/27/01 Site Name: Cherryvale Residential Yards Site Operator Name: R Brown

System Check, Warm-Up and Internal Calibration Notes:
Prepared samples 0-6" sample depth

Method 6200 Utilized? Y X N __ In-situ readings? Y __ N X bagged samples
If N, briefly explain sample preparation, homogenization, sample drying time/temp, analysis notes, etc.:
Samples dried 24hrs @ 60°C w/ lab convection oven

Sample I.D. #	XRF Entry #:	Source:	Run Time (sec.):	Lead (mg/kg):	Comments, Other Constituents, Concentrations, etc.
610 Front #1		Cd-109	33	1080±110	Lab Sample
" " "			33	1440±110	
" " "			34	1270±120	
High STD			85	5140±140	
					Off 1136

ATTACHMENT E

PRELIMINARY REMOVAL SITE EVALUATION/REMOVAL PRELIMINARY ASSESSMENT (PRE) FORM

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
BUREAU OF ENVIRONMENTAL REMEDIATION
PRELIMINARY REMOVAL SITE EVALUATION/
REMOVAL PRELIMINARY ASSESSMENT FORM

I. SITE NAME AND LOCATION:

NAME: Cherryvale Residential Yards Site

ADDRESS OR OTHER LOCATION IDENTIFIER: Martin and Front Streets between Coyle and Catherine Streets

CITY: Cherryvale **COUNTY:** Montgomery	**STATE:** Kansas	**ZIP:** 67335
TELEPHONE:	FAX:	

DIRECTIONS TO SITE:

The site is located in the residential area bounded by the streets indicated above. The site is located in the SE 1/4 of Section 8, Township 32 South, Range 17 East.

MAP ATTACHED? Yes (in RSE Report)

II. SITE REFERRAL INFORMATION:

REQUESTED BY: Rick Bean	**DATE OF REQUEST:** 12/00	
AGENCY/OFFICE: KDHE/Bureau of Environmental Remediation/Remedial Section		
MAILING ADDRESS: Building 740, Forbes Field		
CITY: Topeka	**STATE:** Kansas	**ZIP:** 66620
TELEPHONE: (785) 296-1675	**FAX:** (785) 296-7030	
SITE CONTACT: Randy Brown, KDHE/BER Site Assessment Unit		
AGENCY/OFFICE: KDHE/BER Remedial Section/Site Assessment Unit		
MAILING ADDRESS: Building 740, Forbes Field		
CITY: Topeka	**STATE:** Kansas	**ZIP:** 66620
TELEPHONE: (785) 296-8065	**FAX:** (785) 296-7030	

DEFINITION OF TERMS

CERCLA is the Comprehensive Environmental Response Compensation and Liabilities Act, 42 USC §9601 et seq. (as amended).

A **FACILITY** is defined as any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly-owned treatment works (POTW), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft or any site or area, where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel.

A **HAZARDOUS SUBSTANCE** means any substance, element, compound, mixture, solution, hazardous waste, toxic pollutant, hazardous air pollutant, or imminently hazardous chemical substance or mixture designated pursuant to the Clean Water Act (CWA), CERCLA, Safe Drinking Water Act (SDWA), Clean Air Act (CAA) or Toxic Substances Control Act (TSCA). The term does not include petroleum products, natural gas, natural gas liquids, liquefied natural gas, synthetic gas or mixtures of natural and synthetic gas.

The **LIMITATIONS ON RESPONSE** provisions of the NCP [40 CFR 300.400(b)] states that removals shall not be undertaken in response to a release: of a naturally occurring substance in its unaltered or natural form; from products that are a part of the structure of, and result in exposure within, residential buildings or business or community structures; or into public or private drinking water supplies due to deterioration of the system through ordinary use.

NCP is the National Oil and Hazardous Substances Pollution Contingency Plan 40 CFR §300-302.

OPA is the Oil Pollution Act as amended to § 311 of the Clean Water Act, with response provisions described in § 300.300-300.335 of the NCP.

POLLUTANT or CONTAMINANT includes, but is not limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions or physical deformations, in such organisms or their offspring. The term does not include petroleum products, natural gas, natural gas liquids, liquefied natural gas, synthetic gas or mixtures of natural and synthetic gas.). [40 CFR 300.5]

PRP is potentially responsible party responsible for a release or threat of release of hazardous substances, pollutants or contaminants.

RCRA is the Resource Conservation and Recovery Act of 1976, Public Law 94-580, 40 CFR 250-299

A **RELEASE** is defined as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment of barrels, containers, and other closed receptacles containing any hazardous substances or pollutant or contaminant), but excludes: workplace exposures; engine exhaust emissions; nuclear releases otherwise regulated; and the normal application of fertilizer. For purposes of the NCP, release also means threat of release. [40 CFR 300.5]

A **VESSEL** is defined as any description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel. [40 CFR 300.5]

KDHE/BER PRELIMINARY REMOVAL SITE EVALUATION

III. REMOVAL SITE EVALUATION CRITERIA (40 CFR 300.410[E])

A. IS THERE A RELEASE OR THREAT OF RELEASE AS DEFINED BY THE NCP? YES _X_ or NO __ UNKNOWN _____

EXPLAIN: Lead levels elevated above both residential and non-residential Risk-Based Standards for Kansas (RSK) were identified in several residential soil samples obtained during the PRE/RSE. Cadmium and arsenic were also detected above residential RSKs coinciding with lead levels above 1,000 mg/kg during the PRE/RSE.

B. IS THE SOURCE A FACILITY OR VESSEL AS DEFINED BY THE NCP? YES _X_ or NO __ UNKNOWN _____

EXPLAIN: The site is residential area impacted by an adjacent abandoned primary zinc smelter.

C. DOES THE RELEASE OR THREAT OF RELEASE INVOLVE A HAZARDOUS SUBSTANCE, OR POLLUTANT CONTAMINANT AS DEFINED BY THE NCP? YES _X_ or NO __ UNKNOWN _____

EXPLAIN: Lead, cadmium, and arsenic are hazardous substances as defined in § 302.4 of the NCP.

D. IS THE RELEASE SUBJECT TO THE LIMITATIONS ON RESPONSE? YES __ or NO X_ UNKNOWN _____

EXPLAIN: No limitations on response exist at the Cherryvale Residential Yards site.

E. DOES THE QUANTITY OR CONCENTRATION WARRANT RESPONSE: YES _X_ or NO __ UNKNOWN _____

EXPLAIN: Removal response is warranted because levels of lead, cadmium and arsenic were detected in excess of iresidential RSK levels for lead (400 mg/kg), cadmium (39 mg/kg) and arsenic (11 mg/kg) at the site. Elevated cadmium and arsenic levels above three times (3X) background appear to coincide with lead levels above 1,000 mg/kg from review of laboratory data. Lead was detected at a maximum of 3,680 mg/kg by laboratory analysis in the 618 Front Street #2 sample. Cadmium was detected at a maximum of 160 mg/kg in the 619 Martin #5 sample location. The maximum arsenic detection was 33.7 mg/kg in 618 Front #2. Further removal site evaluation is recommended to the south at least to First Street to further evaluate residential yards since the southern extent of impacted yards was not identified during this RSE. Future removal response should be coordinated with potential National Priorities List (NPL) inclusion and consistent with the overall long-term remedial response objectives for this site.

F. HAS A PRP BEEN IDENTIFIED? YES __ or NO X_

CURRENT OWNER: Multiple

CURRENT OPERATOR: Inactive

FORMER OPERATORS: Edgar Zinc Company, National Zinc Company

G. WHAT IS THE CURRENT LAND USE AROUND THE FACILITY?

RESIDENTIAL X **COMMERCIAL** X **RECREATIONAL** __ **INDUSTRIAL** __ **AGRICULTURAL** __ **WHAT**

IS THE LIKELY FUTURE ZONING OF THE AREA AROUND THE FACILITY?

RESIDENTIAL X **COMMERCIAL** X **RECREATIONAL** __ **INDUSTRIAL** __ **AGRICULTURAL** _

ECONOMIC CONDITIONS SURROUNDING THE SITE, (INDUSTRIALIZED, LOW INCOME, RESIDENTIAL, ETC.):

The site area is located in mixed residential and light commercial area at the north edge of Cherryvale, Montgomery County, Kansas.

H. REGULATORY/OPERATIONAL HISTORY OF THE SITE:

According to Sanborn Fire Insurance maps for the Cherryvale Residential Yards area, the residential area appears to have been the location for support facilities such as a store, church, school, fire station, etc. connected with the National Zinc site. Most of the original National Zinc structures appear to have been demolished and removed by the 1950s from the residential area evaluated for the PRE/RSE.

IV. CONDITIONS TO WARRANT REMOVAL 940 CFR 300.415[b][2]):

A. IS THERE AN ACTUAL OR POTENTIAL EXPOSURE TO HAZARDOUS SUBSTANCES, OR POLLUTANTS, OR CONTAMINANTS? **YES X NO __**

DEFINE THE MEDIA, PATHWAY AND RECEPTOR:

GROUND WATER YES __ NO __ UNKNOWN X RECEPTOR: local private wells

EXPLAIN:. The site is located in a broad, low-relief upland of the Osage Questas physiographic area of southeast Kansas. Bedrock of Pennsylvanian age is present at the base of the soil profile. During the installation of temporary monitoring wells at the site, bedrock was typically encountered between 14 feet (TW-1) and 3.5 feet (TW-8). The bedrock units underlying the site are believed to be composed of sandstone and limestone of the Cherryvale Shale and Dennis Limestone Formations of the Kansas City Group. A yellowish to reddish-brown sandstone was typically encountered as the bedrock layer upon auger refusal during the National Zinc BTA. Ground water occurrence within the Cherryvale Shale and Dennis Formations is typically localized with very low (less than 3 gallons per minute) yields of generally poor quality. These bedrock units typically yield little to no water except in the shallow weathered zone near the upper bedrock surface. Oil field intrusion of brines in the site area from oil production fating back to the early 1900s has impacted shallow ground water quality regionally in this portion of Southeast Kansas (Reference 4). Ground water occurrence in the site area is primarily restricted to unconsolidated alluvial deposits of the Verdigris River and Drum Creek. The City of Cherryvale receives water from a surface intake on Big Hill Lake located approximately five (5) miles east of Cherryvale. Significant karst terrain does not exist in the site area given the sequential shale-sandstone-limestone stratigraphy of the bedrock units. The City of Cherryvale and Montgomery County Rural Water District # 12 supplies water to private residences surrounding the site.

SURFACE WATER YES X NO __ UNKNOWN __ RECEPTOR: environmental targets, potential downstream drinking water intakes

EXPLAIN: The site drainage is to an unnamed tributary of Drum Creek which also drains the National Zinc site. The confluence of this unnamed tributary and Drum Creek is approximately 3/4 mile west of the National Zinc site. Previous surface water releases of sludges have been historically reported from the National Zinc site. Surface water sampling for the National Zinc ESI will further evaluate the surface water pathway. Sediment samples obtained for the BTA have indicated a 3 X background concentration of lead, cadmium and zinc in the surface water ditch draining the National Zinc site.

SOIL YES __ NO __ UNKNOWN X RECEPTOR: nearby residents

EXPLAIN:

Lead, cadmium and arsenic were identified above residential RSKs at the site. At least eleven (11) residential yards were identified as impacted during the PRE/RSE. The primary native soil type identified within undisturbed areas within the site boundaries is the Kenoma series. The Kenoma soils are generally deep, moderately well drained, very slowly permeable soils on uplands. Typical depth of Kenoma soils averages 60 inches or greater. The southern edge of the site is also within the Dennis series, but the native soil profile for this series is very similar to the Kenoma series. hes in this series.

WASTE YES X NO __ UNKNOWN __ RECEPTOR: nearby residents

EXPLAIN:

Surficial smelter waste is present at the National Zinc site immediately north of the residential area evaluated for the PRE/RSE. The National Zinc BTA and ESI contain additional information regarding wastes at the National Zinc site.

AIR YES __ NO __ UNKNOWN X RECEPTOR: nearby residents

EXPLAIN:

No conditions were observed to indicate a potential release to air at the site. Care should be exercised during removal response to minimize potential dust emissions containing elevated concentrations of lead and cadmium to adjacent residential areas.

KDHE/BER PRELIMINARY REMOVAL SITE EVALUATION

B. IS THERE ACTUAL OR POTENTIAL CONTAMINATION OF DRINKING WATER SUPPLIES? YES __ NO __ UNKNOWN _X_

EXPLAIN: The residences in the site area are served with drinking water from the Cherryvale PWS system which utilized a surface water source. No private wells were identified in use within one mile of the site.

C. ARE THERE HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS IN DRUMS, BARRELS, BULK STORAGE CONTAINERS OR TANKS? YES __ or NO X UNKNOWN ___

EXPLAIN: No bulk storage or disposal of containerized hazardous substances or potential hazardous wastes was identified at the site during the PRE.

D. ARE THERE HIGH LEVELS OF HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS IN NEAR-SURFACE SOILS? YES X or NO __ UNKNOWN ___

SURFACE SOIL CONTAMINATION? YES X NO __ UNKNOWN ___

SURFICIAL WASTES PRESENT? YES X NO __ UNKNOWN __

EXPLAIN: Lead, cadmium and arsenic were identified in excess of residential RSKs at the site.

SITE ACCESSIBILITY: SECURE ___ ACCESS LIMITED ___ READILY ACCESSIBLE _X_

EXPLAIN: The site is located in a readily accessible area bounded by residential properties.

E. ARE THERE CONDITIONS ON SITE WHICH MAY BE SUSCEPTIBLE TO IMPACT FROM ADVERSE WEATHER CONDITIONS? YES __ or NO __ UNKNOWN/UNCERTAIN _X_

EXPLAIN: Runoff from exposed smelter waste piles, transport by air or truck traffic from the former National Zinc site has apparently caused releases of heavy metal constituents to adjacent residential soils.

F. IS THERE A THREAT OF FIRE OR EXPLOSION? YES ___ or NO _X_

EXPLAIN: No potentially flammable, ignitable, corrosive or unstable wastes were observed to be stored or managed in a manner to increase risk of fire. The site does not appear to pose a serious fire threat.

G. IS THERE A POTENTIAL FOR OTHER FEDERAL OR STATE RESPONSE MECHANISMS? IF SO, IDENTIFY THE APPROPRIATE PROGRAM: YES_ or NO X

RCRA ___ NRC ___ FIFRA/TSCA ___ UST __ OTHER FEDERAL _____ STATE DEFERRAL _____

EXPLAIN: Identification/confirmation of PRPs has not been successful to date. The site appears to qualify for removal response consistent with the NCP and may also be a candidate for inclusion to the National Priorities List (NPL) and future remedial response actions.

H. ARE THERE ENDANGERED SPECIES HABITATS, WETLANDS, OR OTHER SENSITIVE ENVIRONMENTS NEARBY WHICH MAY BE ADVERSELY IMPACTED BY THE SITE? YES _X_ or NO ___

EXPLAIN: Residential areas are located within the site boundaries.

I. ARE THERE OTHER SITUATIONS OR FACTORS WHICH POSE A THREAT? YES X or NO ___ UNKNOWN _____

EXPLAIN: Elevated levels of lead, cadmium and arsenic were identified in this PRE adjacent to residential areas with little or no access control. This site may qualify for inclusion on the National Priorities List (NPL) and further removal response actions should be consistent and coordinated with future NPL remedial response actions and objectives.

V. POTENTIAL REMOVAL ACTIONS (40 CFR 300.415 [D]):

The following identifies potential removal actions which may be determined to be appropriate pending further review and study. The proposed actions should be considered preliminary proposals and are subject to change.

SITE SECURITY: YES X or NO __

EXPLAIN: Elevated lead levels are present in residential areas.

DRAINAGE CONTROL: YES X or NO __

EXPLAIN: Runoff from former smelter production/ waste areas at the site may be impacting adjacent surface water and sediments in the residential areas during flood periods.

STABILIZATION OR REMOVAL OF SURFACE IMPOUNDMENTS: YES __ or NO X

EXPLAIN: No surface impoundments are present at the site.

CAPPING OF CONTAMINATED SOIL: YES X or NO __

EXPLAIN: Capping of contaminated soils may be an option for areas in excess of RSK soil screening levels to eliminate surficial exposure or further direct contact, air releases or surface water runoff.

USE OF CHEMICALS TO CONTROL/RETARD SPREAD OF CONTAMINATION: YES X or NO __

EXPLAIN: Retardants or stabilizing agents for heavy metals have been effective at other sites in stabilizing lead and cadmium to minimize leaching or bioavailability.

CONTAMINATED SOIL EXCAVATION: YES X NO __ UNKNOWN__

EXPLAIN: Soils in areas in excess of RSK screening concentrations may be best addressed by strategic excavation.

REMOVAL OF DRUMS, TANKS, OR BULK STORAGE CONTAINERS: YES __ NO __

EXPLAIN: No abandoned drums containing waste material were identified at the site. Preliminary soil analysis obtained during the PRE/RSE indicates that lead levels would not likely exceed TCLP criteria and are therefore would not likely be RCRA hazardous (D008) waste.

CONTAINMENT, TREATMENT, OR DISPOSAL OF HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS: YES X NO __ UNKNOWN __

EXPLAIN: Some limited areas of soils may require stabilization. Further sampling at the site may indicate additional areas of waste and impacted soils requiring treatment and/or disposal.

PROVIDE ALTERNATIVE WATER SUPPLIES: YES __ or NO X

EXPLAIN: All areas at the site are supplied with water by the Caney public water supply (PWS) system.

KDHE/BER PRELIMINARY REMOVAL SITE EVALUATION

VI. REMOVAL SITE EVALUATION DETERMINATION AND REMOVAL PRELIMINARY ASSESSMENT FINDINGS AND RECOMMENDATIONS:

REMOVAL ACTION/ASSESSMENT/FURTHER REMOVAL SITE EVALUATION CONSISTENT WITH §§ 300.410-300.415 OF THE NCP RECOMMENDED: YES X NO _ **(RSE contingent on PRP negotiations)**

PRIORITY? __**EMERGENCY RESPONSE** __X__**TIME CRITICAL** __X__**NON-TIME CRITICAL**

FURTHER INTEGRATED CERCLA REMEDIAL SITE EVALUATION/RESPONSE CONSISTENT WITH THE NCP RECOMMENDED ?: YES X **NO__ (Completion of ESI currently underway)**

(Cite one or more of the criteria from SECTION III - REMOVAL SITE EVALUATION CRITERIA, as the basis for the above determination.)

	X	**RELEASE OR THREAT OF RELEASE**	X	**RELEASE INVOLVES FACILITY OR VESSEL**
	X	**HAZARDOUS SUBSTANCE OR POLLUTANT OR CONTAMINANT INVOLVED IN RELEASE**	X	**NO RESPONSE LIMITATIONS**
	X	**SUFFICIENT QUANTITY OR CONCENTRATION**	X	**NO WILLING/CAPABLE PRP RESPONSE**
	X	**ACTUAL OR POTENTIAL EXPOSURE THREATS**		**DRUMS, BARRELS OR BULK CONTAINERS PRESENT**
	X	**HIGH LEVELS OF CONTAMINANTS IN SURFACE SOILS**	X	**SITE SUSCEPTIBLE TO ADVERSE WEATHER CONDITIONS**
		THREAT OF FIRE OR EXPLOSION		**NO OTHER PROGRAM FOR RESPONSE**

(Identify one or more of the removal actions listed in Section V. POTENTIAL REMOVAL ACTIONS, as examples of the types of response actions which are recommended.)

	X	**SITE SECURITY - ACCESSIBILITY**	X	**DRAINAGE CONTROL**
		IMPOUNDMENT STABILIZATION	X	**SOIL CAPPING**
	X	**CHEMICAL CONTROLS**	X	**SOIL EXCAVATION**
		REMOVAL OF DRUMS, BARRELS, ETC.	X	**CONTAIN/THREAT/DISPOSE OF WASTES**
		ALT. DRINKING WATER SUPPLIES	X	**SURROUNDINGS/OTHER (EXPLAIN):**

COMMENTS: Conditions at the site warrant further removal site evaluation and removal response consistent with § 300.415 of the NCP. Elevated levels of lead, cadmium and arsenic in or near residential areas has been identified in the PRE/RSE. The full extent of impacted yards was not identified during the PRE/RSE, and a Phase II RSE is recommended to extend the area of sampling south to First Street between Coyle and Catherine Streets.

Additional remedial site evaluation is currently underway through completion of the ESI at the National Zinc site. Completion of the ESI may indicate that a Hazard Ranking System (HRS) scoring package for inclusion to the National Priorities List (NPL) is appropriate. The Phase II RSE should proceed parallel to ESI/HRS activities to address potential risk and provide further removal site evaluation consistent with § 300.410-300.415 to additional residential yards beyond the extent of this PRE/RSE.

VII. FIELD METHODS AND PROCEDURES

Eleven (11) residential yards were evaluated for the Cherryvale Residential Yards PRE/RSE. Samples were obtained into 1-quart marked zip-lock freezer bags and a laboratory split obtained and placed in a 4-oz prepared heavy metals analysis jar. The RSE Report contains sampling procedures, analytical results, consideration of quality control (QC) criteria and other information in greater detail. The site-specific Quality Assurance Project Plan (QAPP) for the Cherryvale Residential Yards RSE was adhered to for all PRE/RSE site activities.

VIII. FINAL REMARKS AND RECOMMENDATIONS:

A release of hazardous substances to residential yards of lead, cadmium and arsenic above three times background (3X) and KDHE residential RSKs has been identified in the PRE/RSE.

The extent of residential yard contamination was not identified in the RSE. A Phase II RSE is recommended to further evaluate residential yards to the south to First Street between Coyle and Catherine Streets. The Cherryvale Residential Yards site appears to qualify for further removal response actions consistent with § 300.415 of the NCP.

The Expanded Site Inspection of the National Zinc site is underway, and data from this PRE/RSE will be used to supplement the ESI, especially with regards to the soil pathway. Upon completion of the ESI, the site may be a candidate for completion of a Hazard Ranking System package and listing on the National Priorities List (NPL).

Further removal response may also be appropriate at the site but should be consistent with overall remedial objectives for the site. If the site is listed on the NPL, residential areas impacted by elevated levels of heavy metals above residential RSKs should be prioritized for initial remedial/removal response actions if not previously conducted.

IX. EVALUATOR/REVIEW:

SIGNATURE:_____ **DATE:** **March 27, 2001**

Randolph L. Brown, Site Assessment Unit Chief

POSITION/TITLE: **Environmental Geologist/Unit Chief, Site Assessment Unit**

OFFICE/AGENCY: **KDHE/Bureau of Environmental Remediation/Remedial Section**

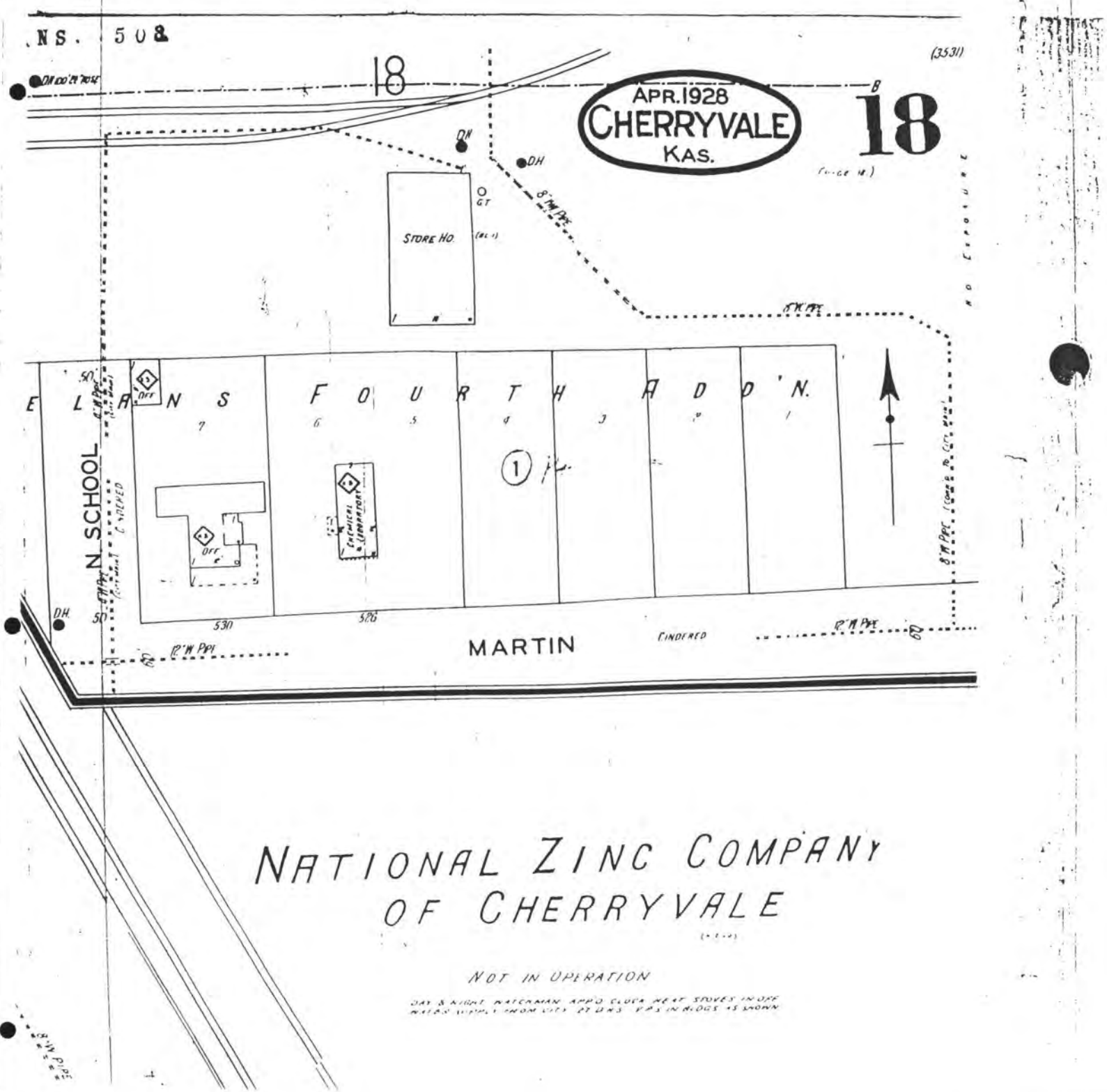
REVIEWED BY:_____ **DATE:** **March 29, 2001**

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

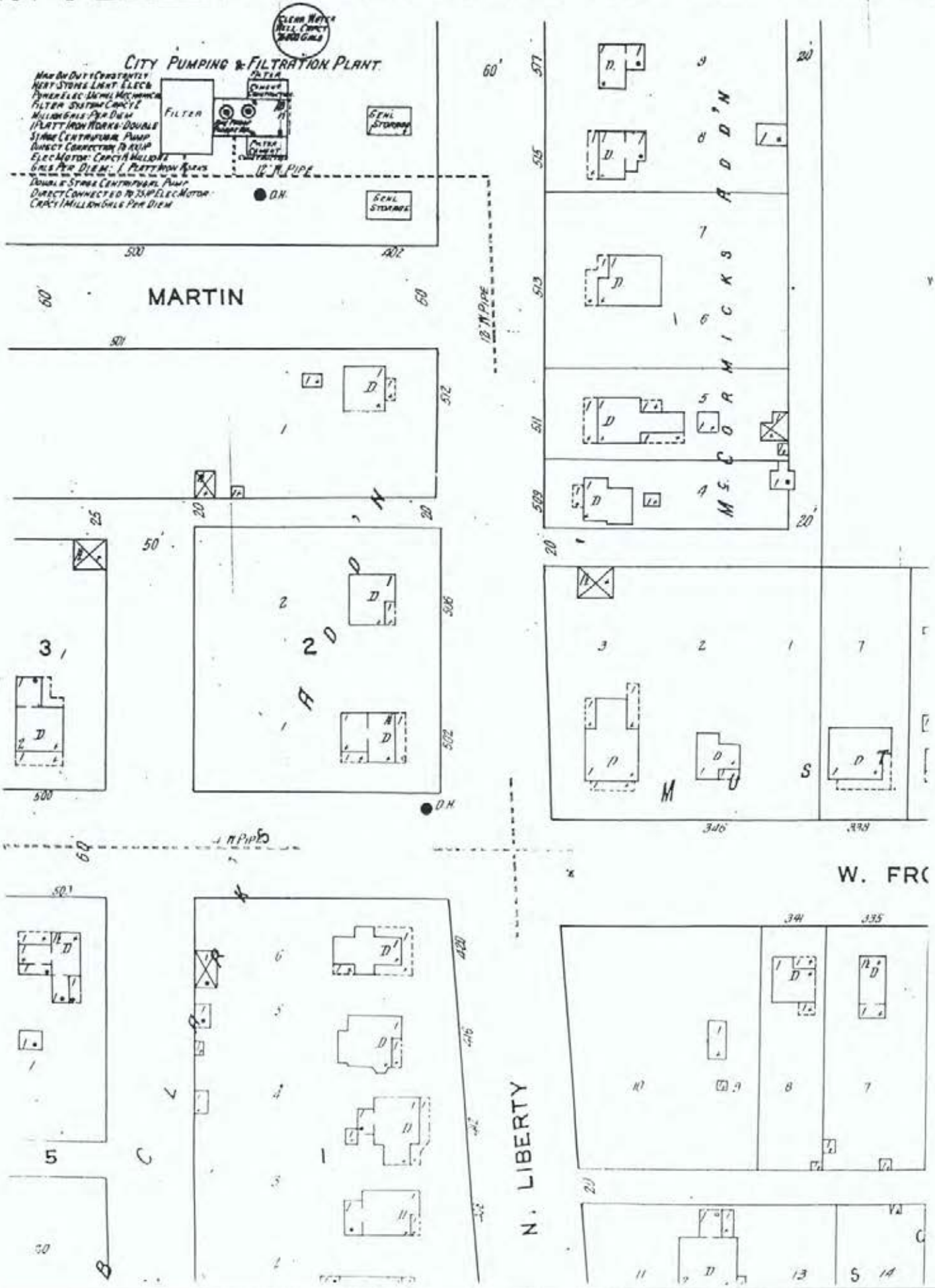
ATTACHMENT F

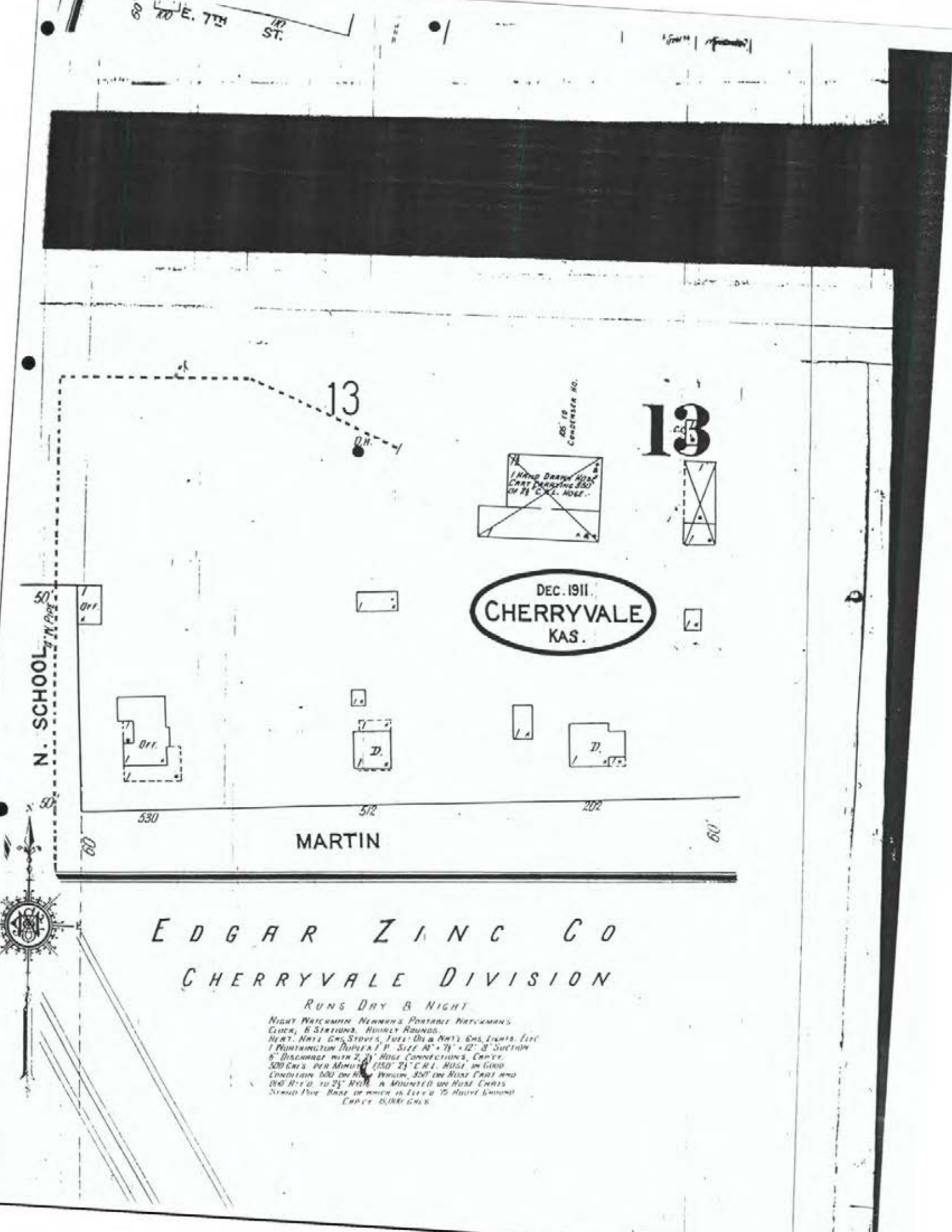
PORTIONS OF SANBORN FIRE INSURANCE MAPS FOR CHERRYVALE, KANSAS 1905-1928

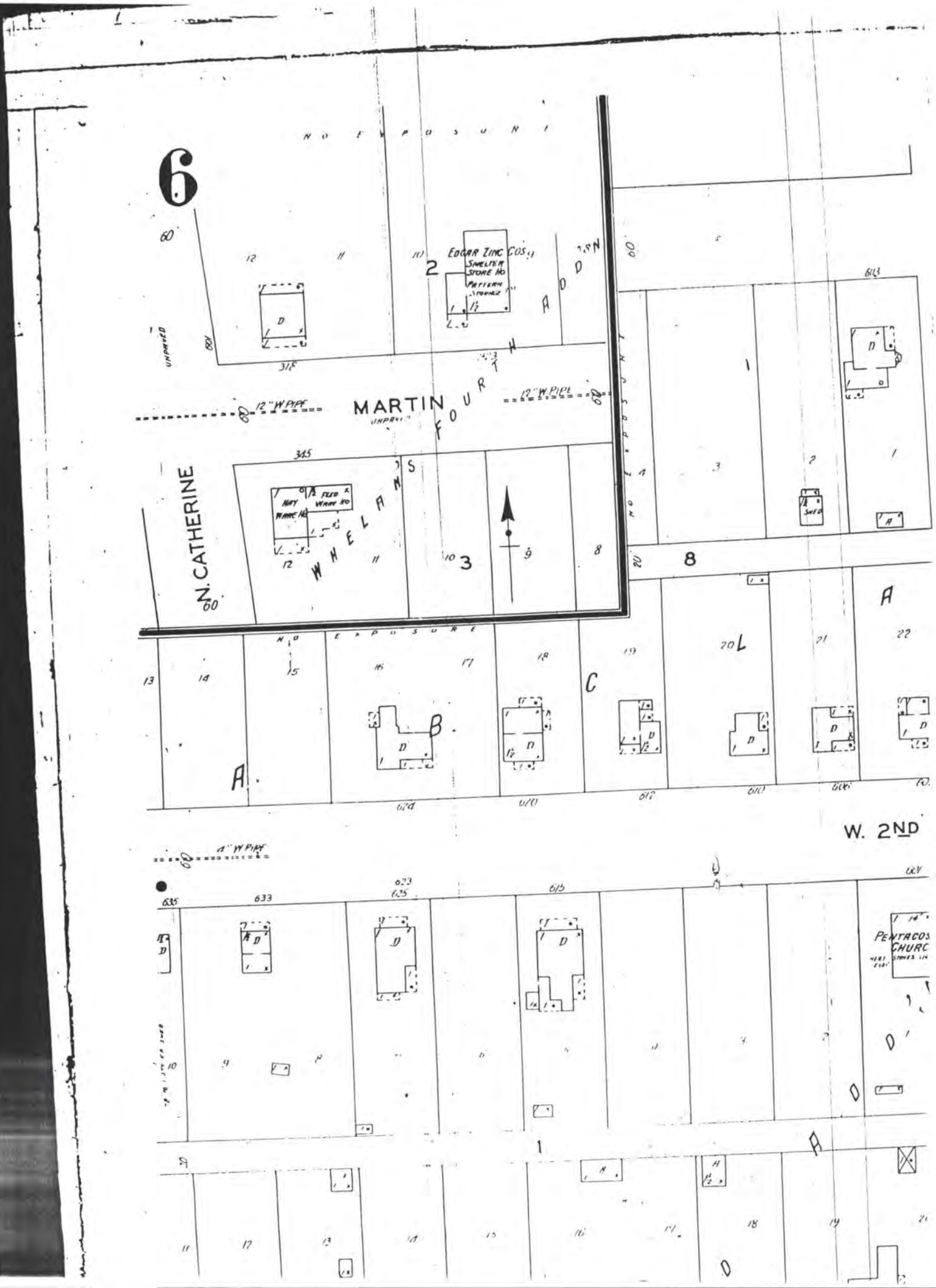
[redacted]

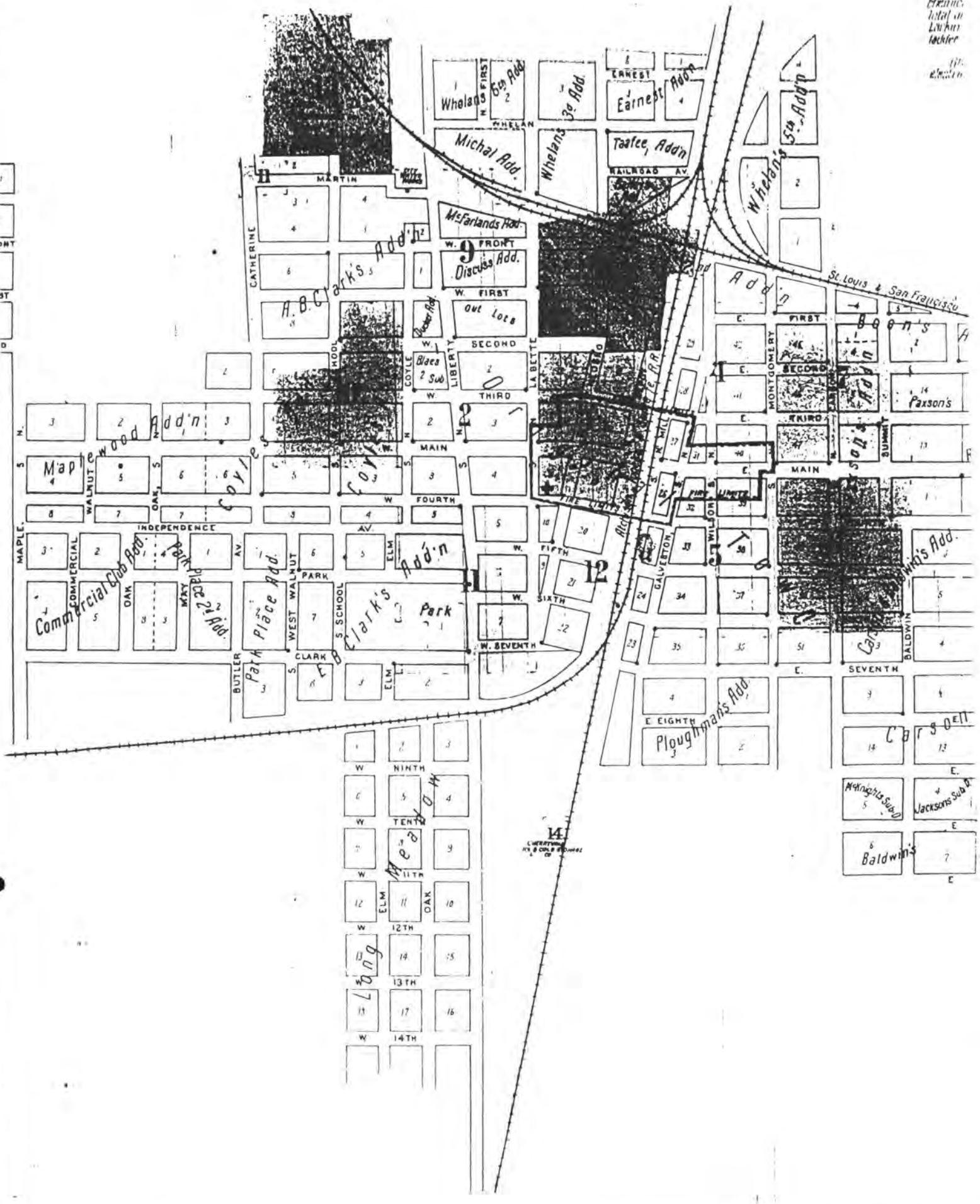


.NS. 508
(3531)
18
APR. 1928
CHERRYVALE
KAS.
18
DH
DH
GT
STORE HO.
8" W PIPE
8" W PIPE
E L A N S F O U R T H A D D'N.
N SCHOOL
OFF
OFF
CHEMICAL LABORATORY
DH
530
526
MARTIN
CINDERED
12" W PIPE
12" W PIPE
8" W PIPE
NATIONAL ZINC COMPANY
OF CHERRYVALE
NOT IN OPERATION
DAY & NIGHT WATCHMAN APP'D CLOCK HEAT STOVES IN OFF
WATER SUPPLY FROM CITY 27 D.H.S. V.P.S. IN BLDGS AS SHOWN

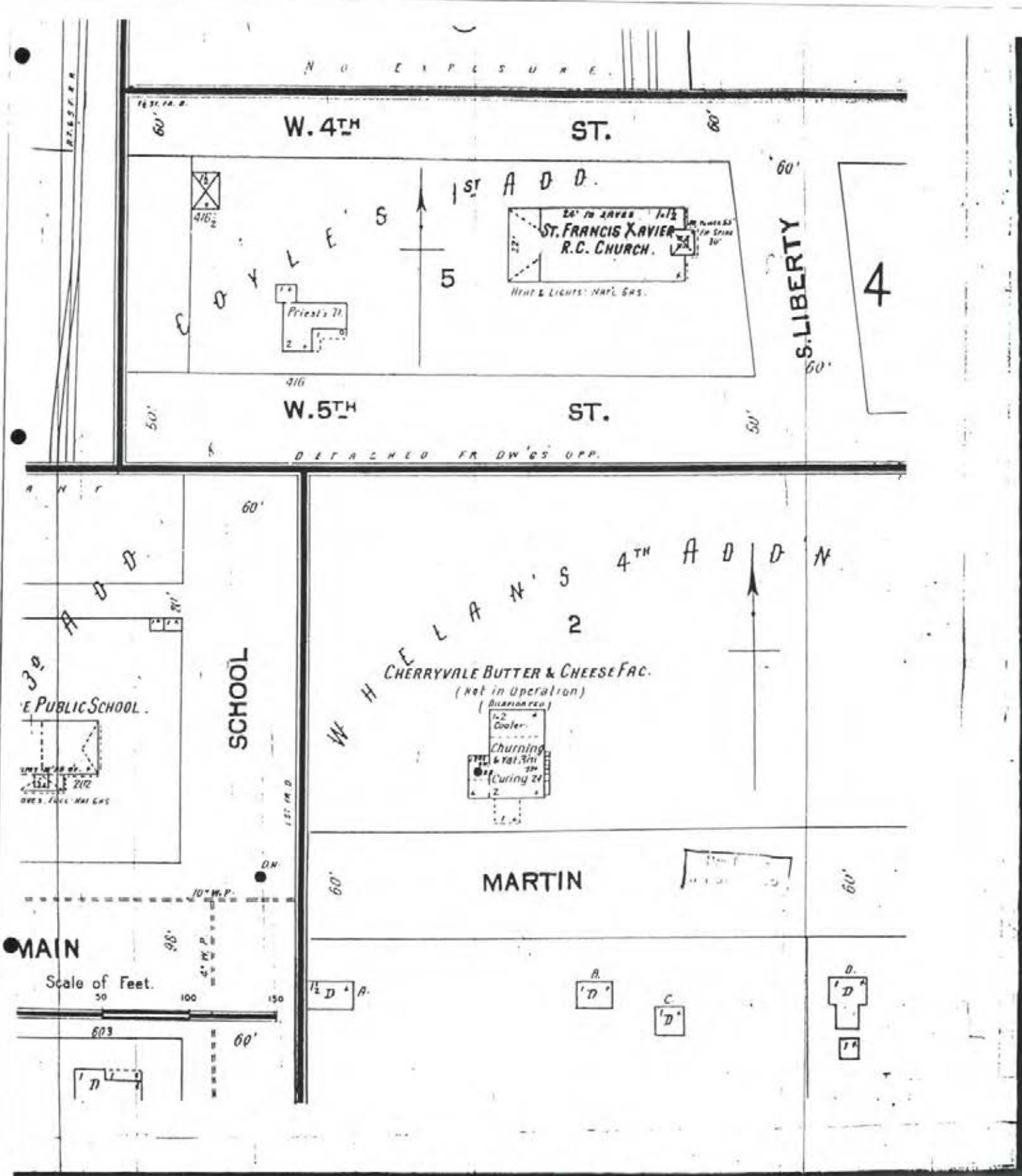

CITY PUMPING & FILTRATION PLANT
FILTER
GENL STORAGE
12" W. PIPE
O.H.
MARTIN
McCORMICKS ADD'N
W. FRO
N. LIBERTY

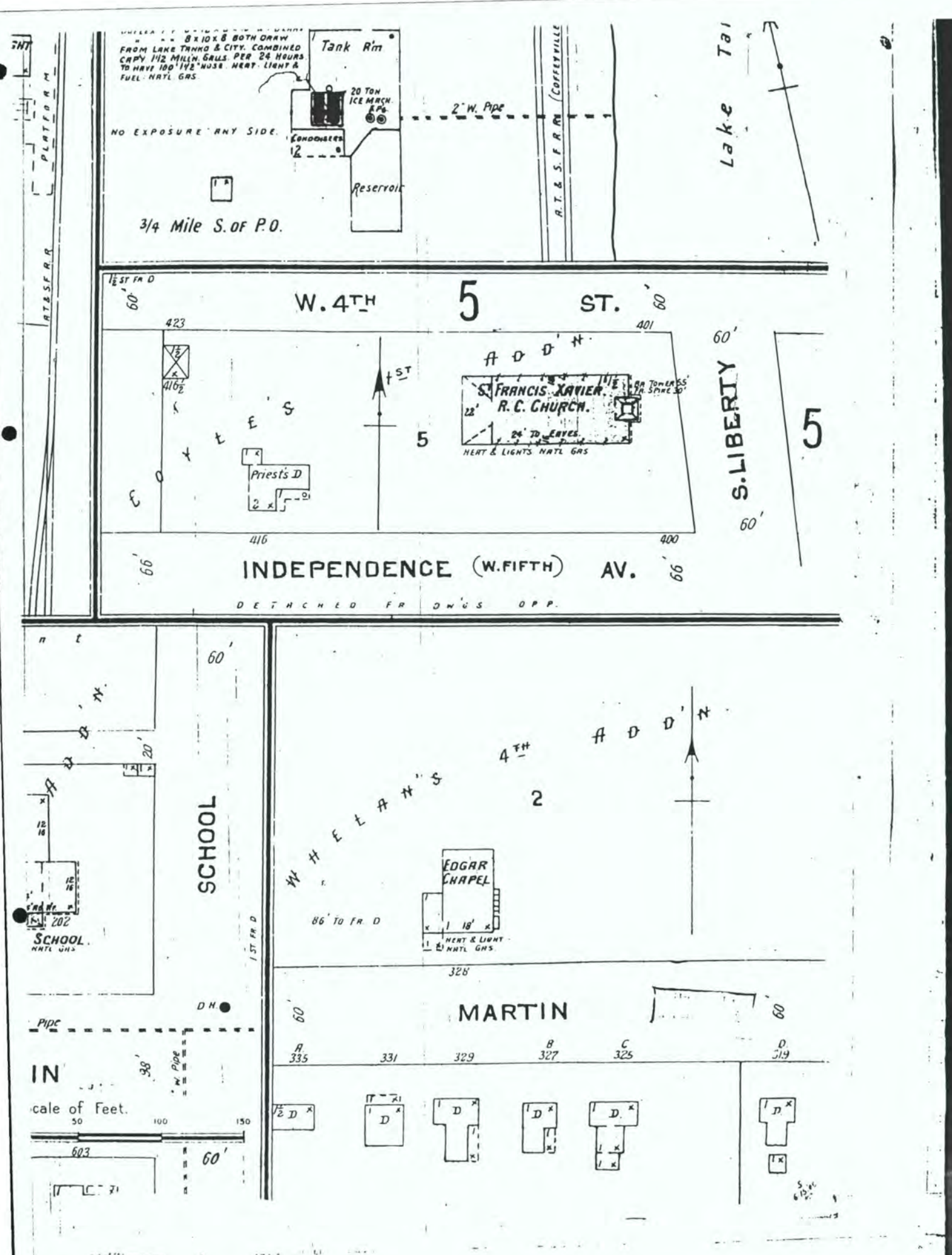

E. 7TH ST.
13
13
DEC. 1911.
CHERRYVALE
KAS.
N. SCHOOL
MARTIN
530
512
202
60
60
50
50
Off.
Off.
D.
D.
EDGAR ZINC CO
CHERRYVALE DIVISION
RUNS DAY & NIGHT
NIGHT WATCHMAN NEWMAN'S PORTABLE WATCHMAN'S CLOCK, 6 STATIONS, HOURLY ROUNDS.
HEAT. NAT'L GAS, STOVES, FUEL: OIL & NAT'L GAS, LIGHTS, ETC
1 WORTHINGTON DUPLEX F.P. SIZE 14" × 7½" × 12" 8" SUCTION
6" DISCHARGE WITH 2, 2½" HOSE CONNECTIONS, CAP'CY.
500 GAL'S PER MINUTE (150' 2½" C.R.L. HOSE IN GOOD
CONDITION 600 ON HOSE WAGON, 350' ON HOSE CART AND
900 ATT'D. TO 2½" HYDS. & MOUNTED ON HOSE CARTS
STAND PIPE BASE OF WHICH IS ELEV'D 75 ABOVE GROUND
CAP'CY. 15,000 GAL'S


6
NO EXPOSURE
EDGAR ZINC COS
SMELTER STORE HO
PATTERN STORAGE
MARTIN
12" W PIPE
WHELAN'S FOURTH ADDN
N. CATHERINE
HAY WARE HO
FEED WARE HO
SHED
W. 2ND
4" W PIPE
PENTACOS CHURC



Whelans 6th Add.
Whelans 3d Add.
Earnest Add'n
Taafee, Add'n
Michal Add.
Whelan's 5th Add'n
McFarlands Add.
Discuss Add.
A. B. Clark's Add'n
Out Lots
Blaes 2 Sub
Maplewood Add'n
Coyles
Commercial Club Add.
Park Place 2d Add.
Park Place Add.
E. B. Clark's Add'n
Park
Long Meadow
Paxson's
Ploughman's Add.
Carson
McKnights Sub D.
Jacksons Sub D.
Baldwin's
St. Louis & San Francisco
MARTIN
WHELAN
ERNEST
RAILROAD AV.
FRONT
FIRST
SECOND
THIRD
MAIN
FOURTH
INDEPENDENCE
PARK
CLARK
FIFTH
SIXTH
SEVENTH
EIGHTH
NINTH
TENTH
11TH
12TH
13TH
14TH
CATHERINE
MAPLE
WALNUT
OAK
COMMERCIAL
MAY
BUTLER
WEST WALNUT
S. SCHOOL
ELM
COYLE
LIBERTY
LA BETTE
MONTGOMERY
WILSON
GALVESTON
BALDWIN
SUMMIT
FIRE LIMITS


NO EXPOSURE
W. 4TH ST.
1ST ADD.
COYLE'S
5
ST. FRANCIS XAVIER R.C. CHURCH.
HEAT & LIGHTS: NAT'L GAS.
Priest's H.
S. LIBERTY
4
W. 5TH ST.
DETACHED FR DW'GS OPP.
SCHOOL
PUBLIC SCHOOL.
WHELAN'S 4TH ADDN
2
CHERRYVALE BUTTER & CHEESE FAC.
(Not in operation)
Churning
Curing 24
MARTIN
MAIN
Scale of Feet.
50
100
150



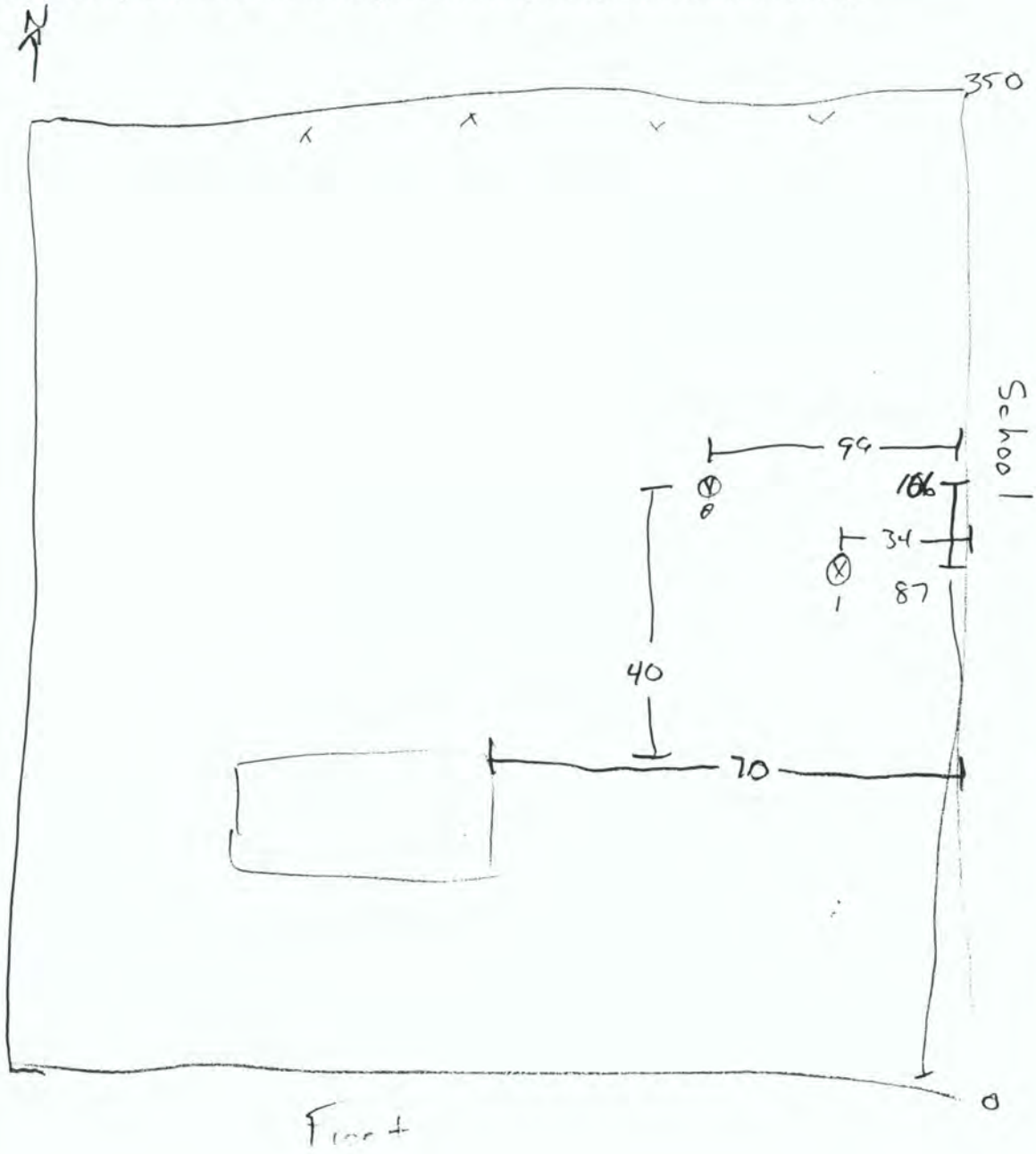
8 x 10 x 8 BOTH DRAW FROM LAKE TANKO & CITY. COMBINED CAP'Y 1½ MILL'N. GALLS. PER 24 HOURS TO HAVE 100' 1½" HOSE. HEAT. LIGHT & FUEL. NAT'L GAS.
Tank R'm
20 TON ICE MACH. & P'G.
2" W. Pipe
NO EXPOSURE ANY SIDE.
CONDENSERS
Reservoir
3/4 Mile S. of P.O.
A.T. & S.F.R.R. (COFFEYVILLE
Lake Ta
PLATFORM
A.T.&S.F.R.R.
1½ ST FR D
W. 4TH
5
ST.
60'
423
401
416½
ADD'N
1 ST
ST. FRANCIS XAVIER R.C. CHURCH.
22'
24' TO EAVES.
HEAT & LIGHTS NAT'L GAS
Priest's D
5
S. LIBERTY
60'
416
400
66'
INDEPENDENCE (W. FIFTH) AV.
DETACHED FR DW'GS OPP.
60'
ADD'N
20'
SCHOOL
202
SCHOOL
NAT'L GAS
1 ST FR D
D.H.
Pipe
IN
38'
W. Pipe
cale of Feet.
50
100
150
603
60'
WHELAN'S 4TH ADD'N
2
EDGAR CHAPEL
18'
86' TO FR. D
HEAT & LIGHT NAT'L GAS
328
MARTIN
60'
A 335
331
329
B 327
C 325
D 319

ATTACHMENT G

RESIDENTIAL YARD SAMPLING FORMS

Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address: 610 Front

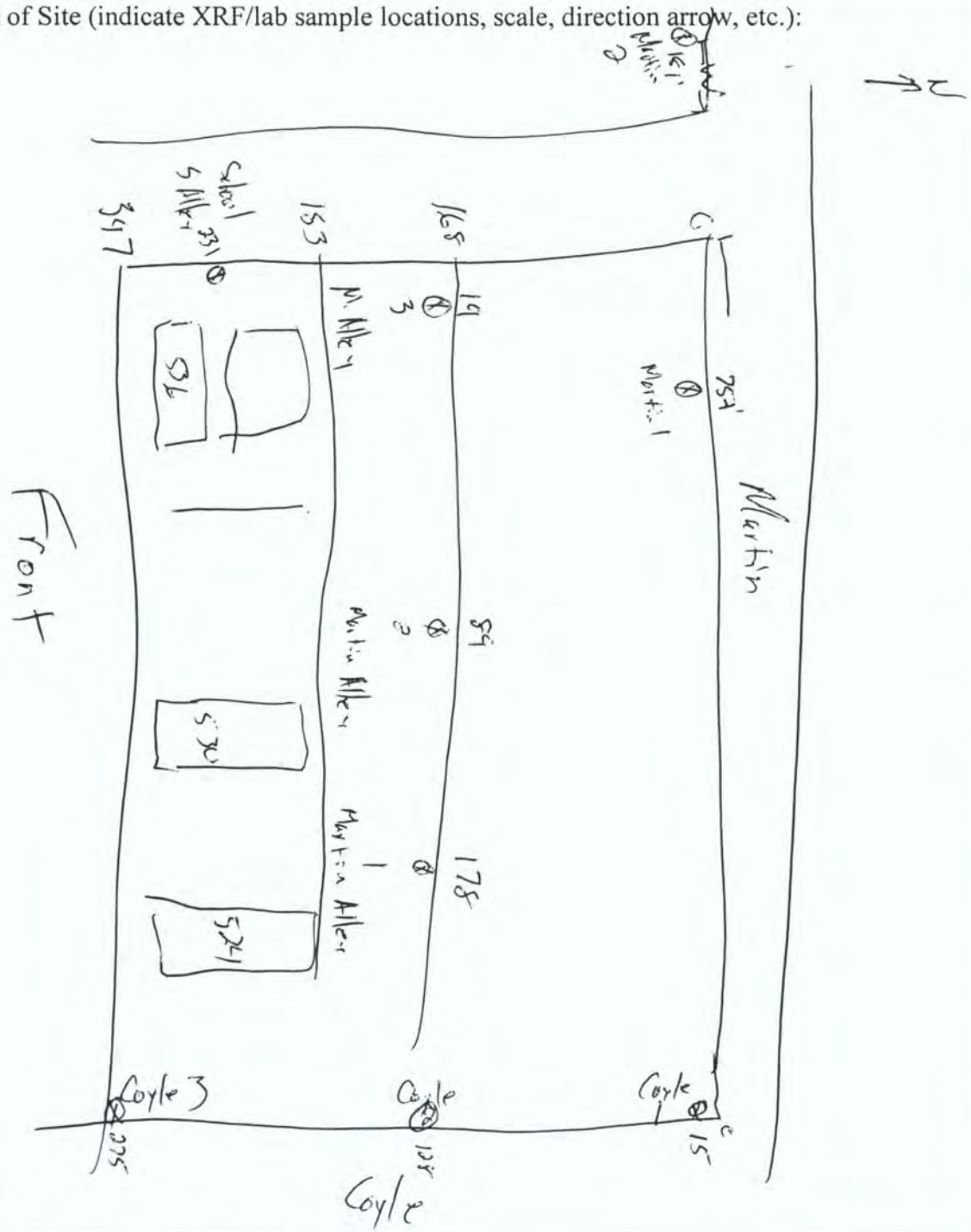
Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Residential Yard XRF Sampling Form

Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address:

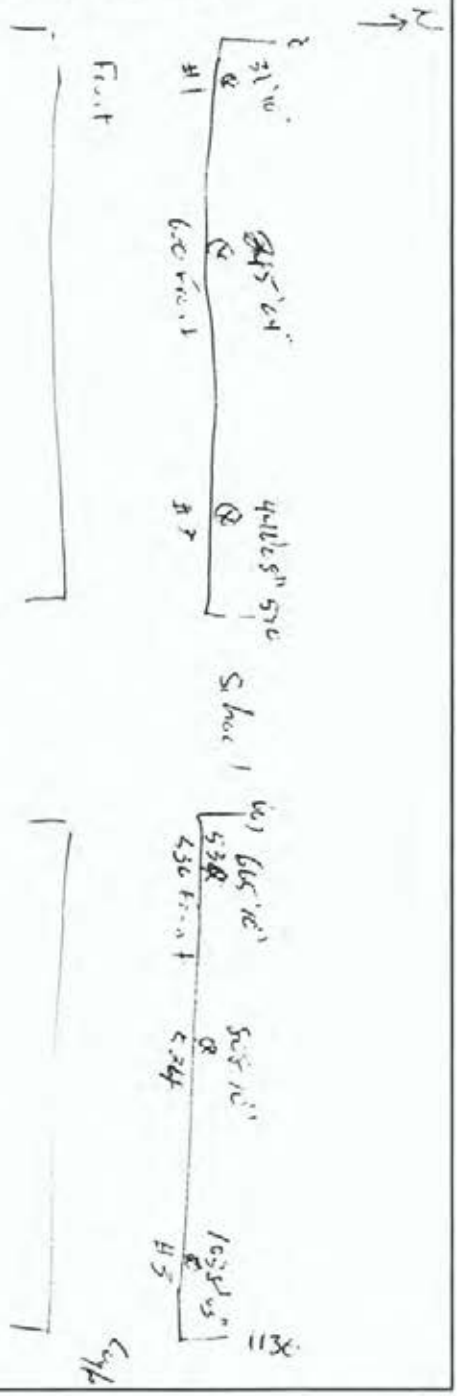
Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Residential Yard XRF Sampling Form

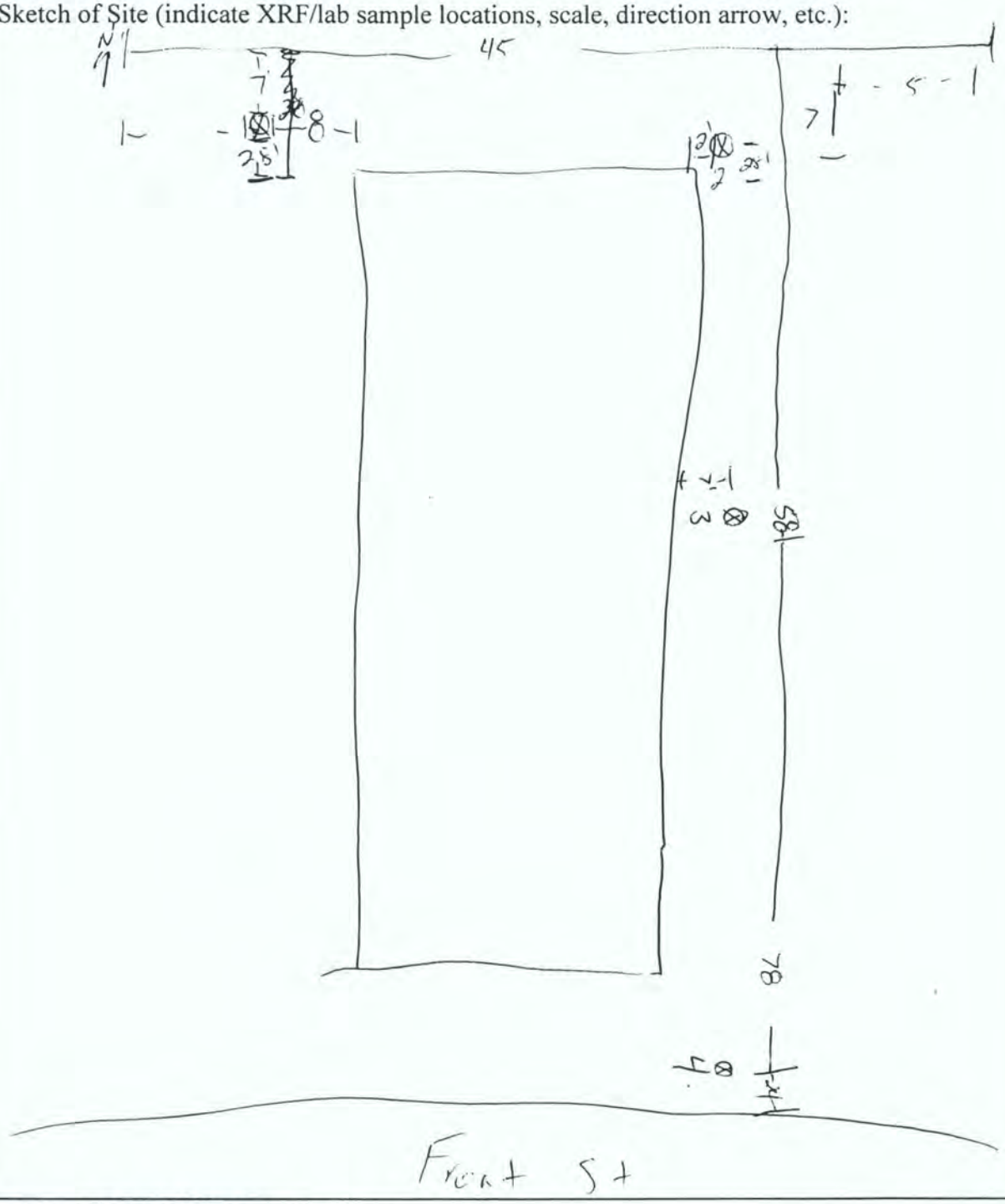
Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address:

Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address: 520 Front St

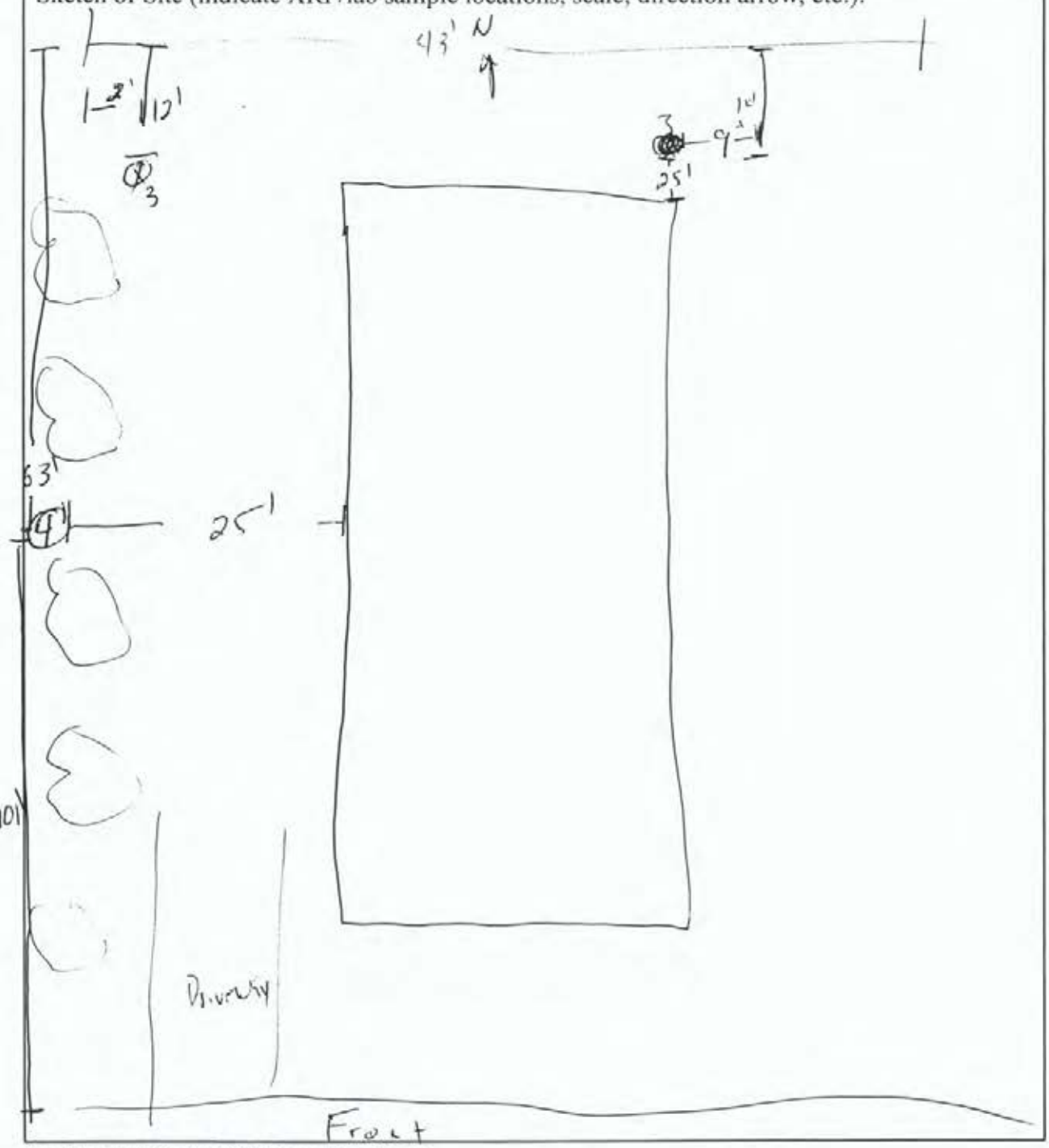
Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Residential Yard XRF Sampling Form

Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address: 524 Front

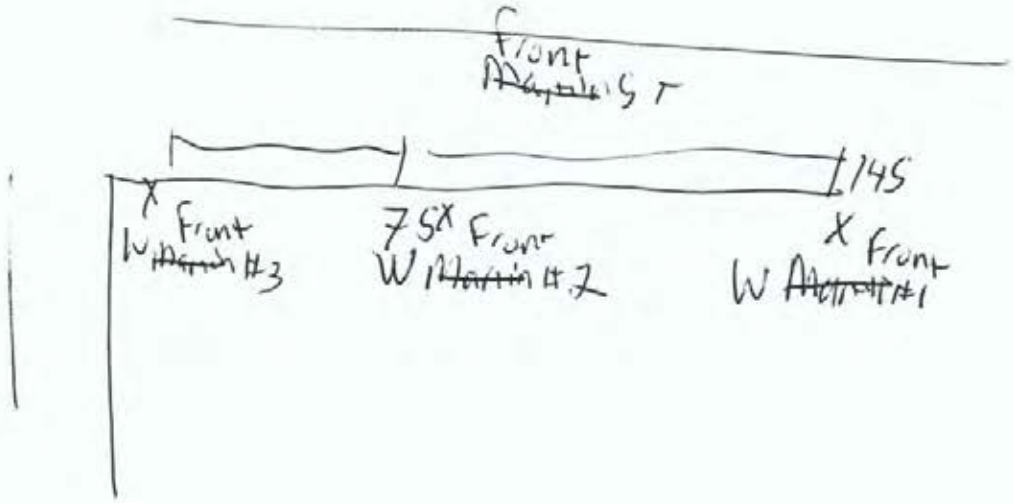
Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Residential Yard XRF Sampling Form

Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address:

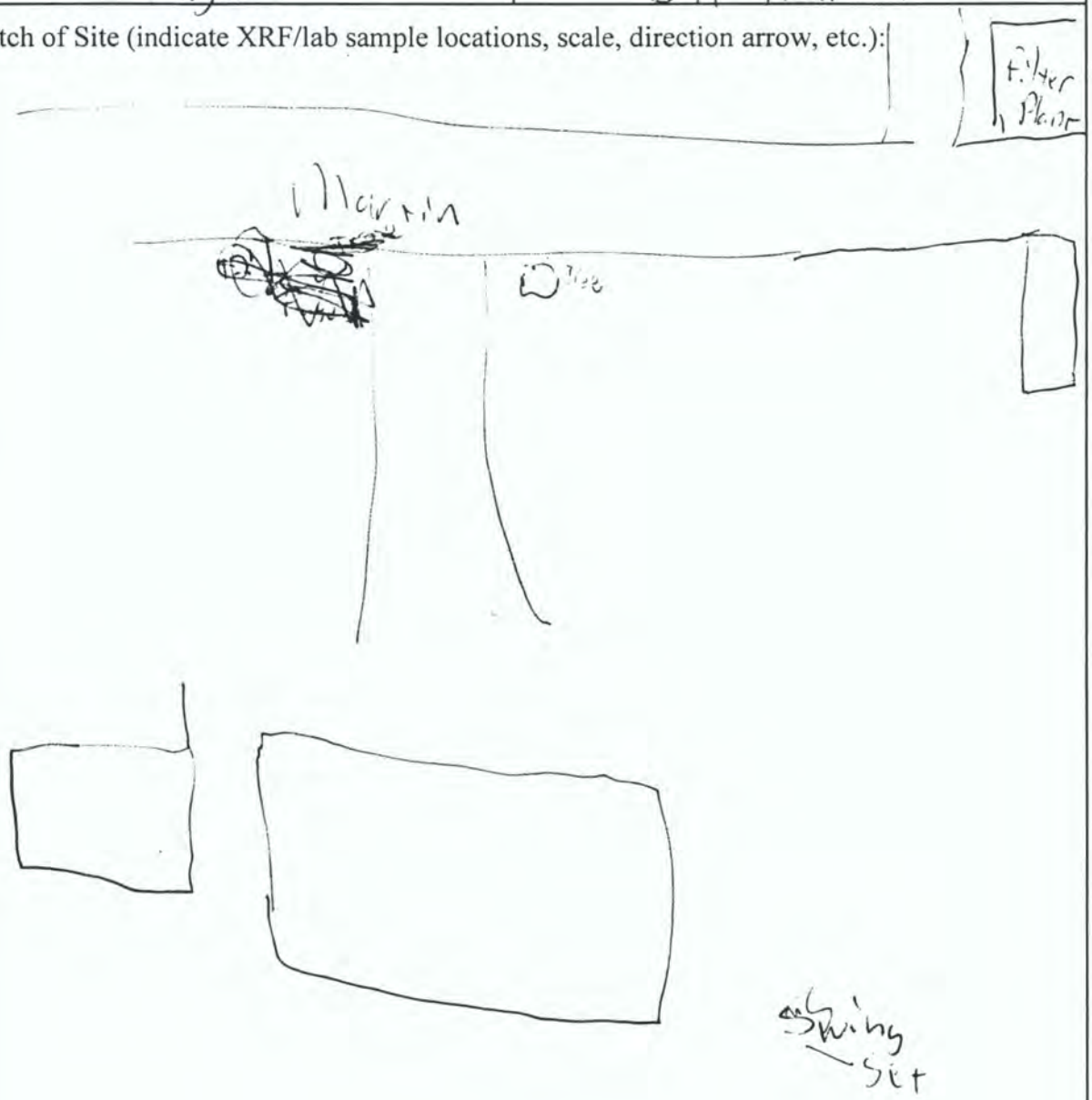
Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Cherryvale Residential Yards Site Sampling Form

Resident Name: Page	Resident Address: 511 Martin

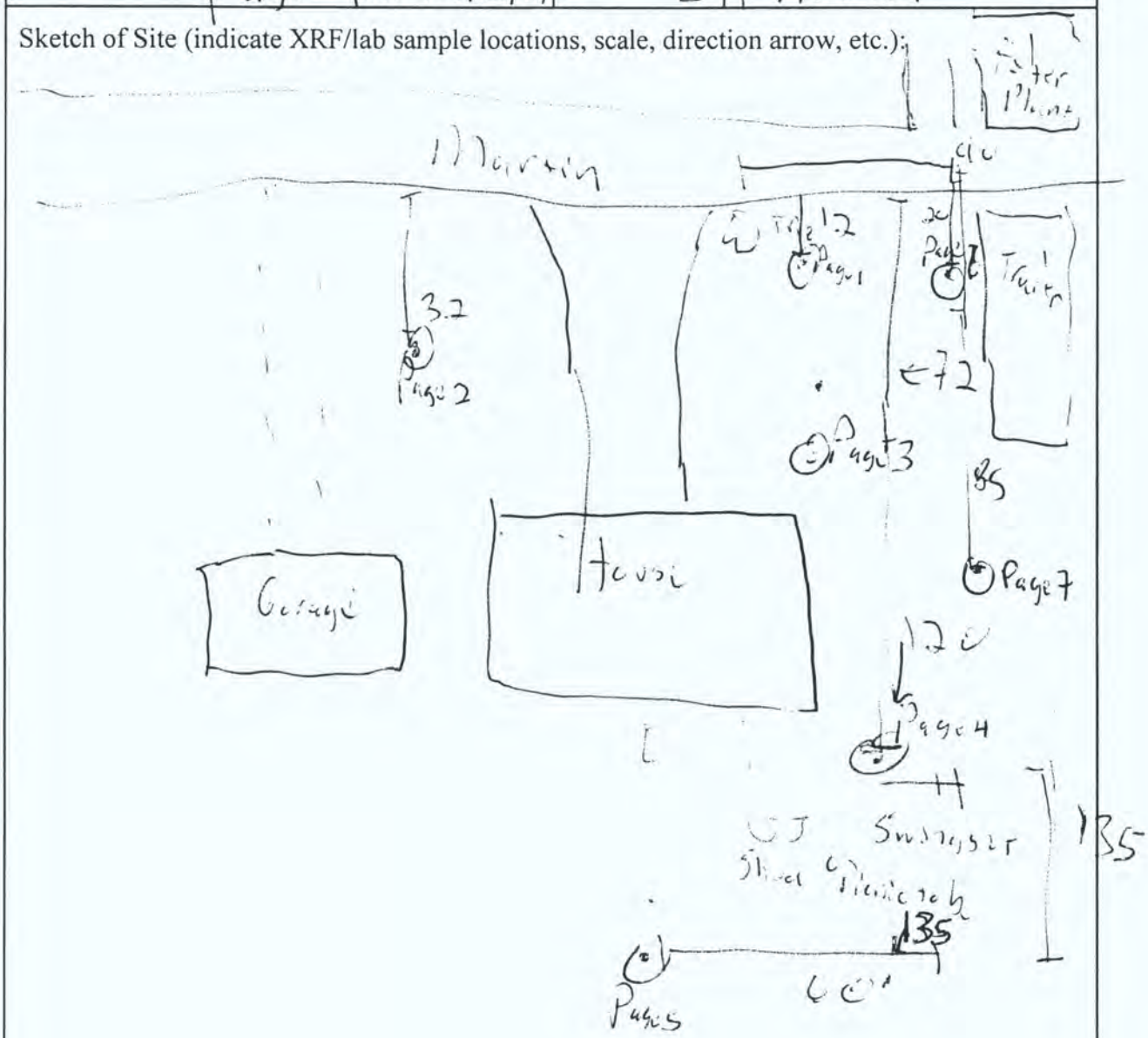
Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Residential Yard XRF Sampling Form

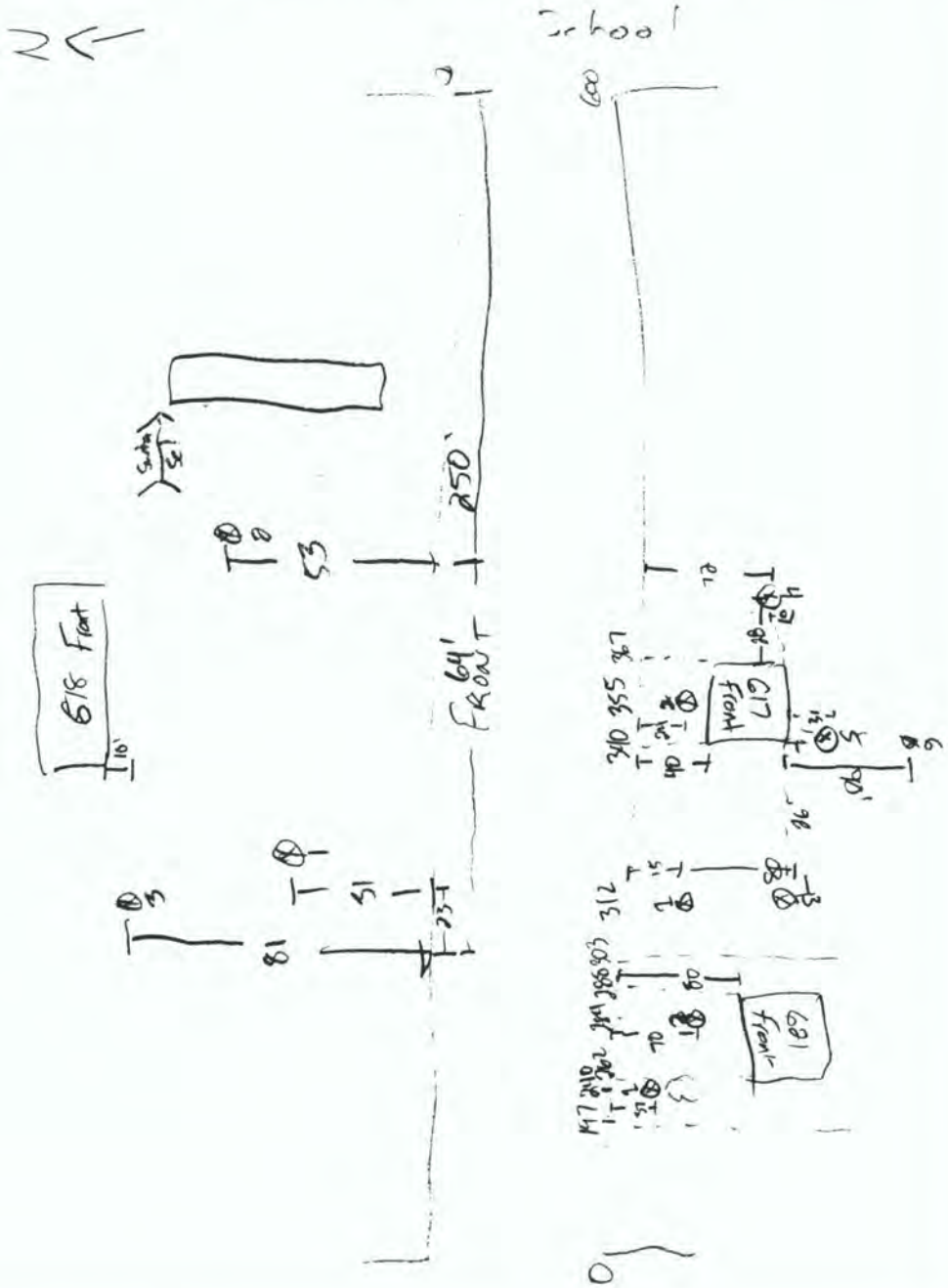
Cherryvale Residential Yards Site Sampling Form	
Resident Name: Page Date: 03/05/01	Resident Address: 511 Martin

Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



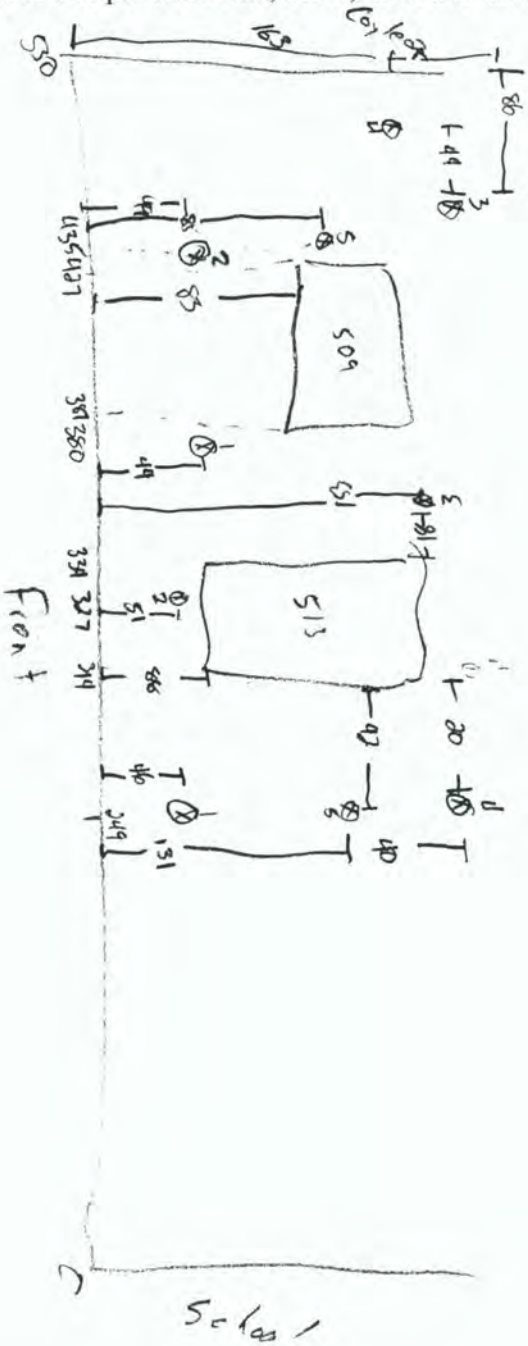
Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address: FRONT SRROW

Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Cherryvale Residential Yards Site Sampling Form	
Resident Name:	Resident Address: 509 / 513 Front

Sketch of Site (indicate XRF/lab sample locations, scale, direction arrow, etc.):



Residential Yard XRF Sampling Form

ATTACHMENT H

PRE-CERCLIS CHECKLIST AND INITIATION FORMS

PRE-CERCLIS SCREENING ASSESSMENT CHECKLIST/DECISION FORM

This checklist can assist the site investigator during the Pre-CERCLIS screening. It will be used to determine whether further steps in the site investigation process are required under CERCLA. Use additional sheets, if necessary.

Checklist Preparer: **Randolph L. Brown Site Assessment Unit Chief** (Name/Title) — **03/27/01** (Date)
Building 740, Forbes Field (Address) — (785) 296-8065 (Phone)
Rbrown@kdhe.state.ks.us (E-Mail Address)

Site Name: 901 East Santa Fe Site
Previous Names (if any): Coastal Mart # 1177 UST Trust Fund Site
Site Location: 901 East Santa Fe Drive (Street)
Olathe, Kansas 66061 (City)
Legal Location: **Section 36, T. 13 S., R. 23 E**

Complete the following checklist.	**YES**	**NO**
1. Does the site already appear in CERCLIS?	□	X
2. Is the release from products that are part of the structure of, and result in exposure within, residential buildings or businesses or community structures?	□	X
3. Does the site consist of a release of naturally occurring substances in its unaltered form, or altered solely through naturally occurring processes or phenomena, from a location where it is found naturally?	□	X
4. Is the release into a public or private drinking water supply due to deterioration of the system through ordinary use?	□	X
5. Is some other program actively involved with the site (i.e. another Federal, State, or Tribal program)?	X	□
6. Are the hazardous substances potentially released at the site regulated under a statutory exclusion (i.e., petroleum, natural gas, natural gas liquids, synthetic gas usable for fuel, normal application of fertilizer, release located in a workplace, naturally occurring, or regulated by the NRC, UMTRCA, or OSHA?	□	X
7. Are the hazardous substance potentially released at the site excluded by policy considerations (e.g., deferral to RCRA Corrective Action)?	□	X
8. Does sufficient documentation exist that clearly demonstrates that there is no potential for release that could cause adverse environmental or human health impacts (e.g., comrehensive remedial investigation equivalent data showing no release above ARARs, completed removal action, previous HRS score determined, ASTM Phase I, II, etc. completed, EPA approved risk assessment completed)?	□	X

Please explain all "yes" answer(s), attach additional sheet if necessary: An Expanded Site Inspection (ESI) is currently underway at the adjacent National Zinc site. Pending ESI results/HRS listing, further removal response options should be coordinated and consistent with ESI/HRS/NPL actions.

Regional EPA Reviewer: _____ _____
Print Name/Signature — Date

State Agency/Tribe: Randolph L. Brown — 03/29/01
Print Name/Signature — Date

REGION VII U.S. EPA SUPERFUND — ***PRE-CERCLIS INITIATION FORM***

NO EPA ID — NO DISCOVERY DATE — NPL Status = O-NOT A VALID SITE OR INCIDENT

Site Name: Cherryvale Residential Yards Site — Initiated Date 03/29/01 — Initiated By: ☐ Removal **X Site Assessment**

List Site Alias Name (s): National Zinc Residential Yards Site

Address: Martin and School Street (center of site) — County Name: Montgomery

City, State, Zip: Olathe, Kansas 67335 — State ID (if one exists): C30637109 — Congressional District: 04

NPL Status: ☒ NOT A VALID SITE OR INCIDENT — Federal Facility?: ☐ Yes **X No**

Section: ☐ C-(SACR) Site Assessment/Cost Recovery Branch — X L-(EFLR) Enfr/Fund Lead RV Branch — Kansas State Lead
☐ F-(FFSE) Federal Facilities/Apecial Emphasis Brnach — ☐ M-(MOKS) MO/KS remedial Branch
☐ I-(IANE) IA/NE Remedial Branch — ☐ O-(ER&R) Emergency Response & RV Branch

Directions to Site: South on Manhattan Avenue from Fort Riley Boulevard

Site Description:

Site Size: 20

Site Dimension: **XAcres** ☐ Square Feet ☐ Feet ☐ Square Miles ☐ Miles

Site Type (Choose one): ☐ Disposal ☐ Storage ☐ Midnight Dump ☐ Transportation Related ☐ Other ☐ Treatment ☐ Production Facility (active) ☐ Production Facility (inactive)

USGS Quadrant: Cherryvale USGS Hydro Unit:

Latitude: 39 42 30.00 **Longitude: 96 25 00** ☐ Treatment (active)

Lat/Long Accuracy: X Seconds ☐ Miles ☐ Feet ☐ Degrees ☐ Minutes ☐ Kilometers ☐ Meters

RCRA Site:

Lat/Long Source: ☐ EPA Region 7 ☐ EPIC ☐ Regulated Entity X Private ☐ Geograph ☐ SNAP ☐ Other ☐ Other Fed Agency ☐ Contractor ☐ EPA HQ ☐ Contractor

Operational Status: ☐ Active X Inactive ☐ Unknown

Owner Operator Type(choose one): ☐ Bank/Loan Company ☐ County Owned ☐ District Owned ☐ Federally Owned ☐ Former Federally Owned or Operated ☐ Government Owned/Contractor Operated ☐ Privately Owned/Government Operated ☐ Property Defaulted Back to Government ☐ Municipality ☐ Indian Lands ☐ Other ☐ State Owned ☐ Private ☐ Trustee, Federal **X Mixed Ownership** ☐ Trustee, State

Incident Type: ☐ Non-Oil Spill ☐ Oil Spill X Unknown

Incident Category: (Choose one) ☐ Abandoned ☐ Chemical Plant ☐ City Contamination ☐ Dioxin ☐ Ecological Damage ☐ Federal Facility ☐ Housing Area/Farm ☐ Industrial Waste Treatment ☐ Waterways/Creeks Rivers ☐ Fire/Explosion ☐ Landfill ☐ Groundwater ☐ Miltary Related ☐ Other ☐ Biological Threat **X Smelter** ☐ Wells ☐ Pure Lagoons ☐ Radioactive Site ☐ Inorganic Waste ☐ Mines/Tailings ☐ Unknown ☐ Manufacturing Plant

Add Action: ☒ PRE-CERCLIS SURVEYS Planned Complete: 03/31/01 Actual Complete: 03/29/01 OU 00

Lead code (choose one): ☐ F-EPA Fund Fianced ☐ FF - Federal Facility X S - State, Fund Financed SCAP Note:

Comment: X Site or ☐ Action: **Separate CERCLIS entry not recommended pending ESI/HRS status; may need removal start if actions not completed as part of NPL site actions**

Non-NPL Status (Choose one):

☐ Addressed as part of NPL site (AX)
☐ Combined PA/SI Ongoing (CO)
☐Combined PA/SI Start Needed (CS)
☐Deferral of NPL Listing Dec. While States Oversee Resp. (SD)
X ESI Ongoing (EO)
☐ESI Start Needed (ES)
☐Fed Fac ESI Review Start Needed(FE)
☐Fed Fac Prelim Assessment Rev Ongoing (PG)
☐Fed Fac Prelim Assessment Rev Start Needed(PN)
☐ Fed Fac Site Inspection Rev Ongoing (FG)
☐ Fed Fac Site Inspection Rev Start Needed (FS)
☐ HRS Ongoing (HO)
☐ HRS Package Completed-Further Eval. Needed (HN)
☐ HRS Start Needed (HS)
☐ Integrated ESI RI Ongoing (IO)
☐ Integrated ESI/RI Start Needed (IS)
☐ Integrated Removal/Remedial Evaluation Ongoing (IN)
☐ Integrated Removal/Remedial Eval Start Needed (IR)
☐ NFRAP (NF)
☐ Other Cleanup Activity: Fed Fac-lead Cleanup (OF)
☐ Other Cleanup Activity: Private Party-Lead Cleanup (OP)
☐ Other Cleanup Activity: State-Lead Cleanup (OS)
☐ Other Cleanup Activity: Tribal-lead Cleanup (OT)
☐ PA Ongoing (PO)
☐ PA Start Needed (PS)
☐ Ref to Removal-Further Assessment Needed (RW)
☐ Referred to Removal - NFRAP (RR)
☐ Removal Only Site (No Site Assess Work Needed) (RO)
☐ SI Ongoing (SO)
☐ SI Start Needed (SS)
☐ SIP Ongoing (SG)
☐ SIP Start Needed (SN)
☐ Site Reassessment Ongoing (SR)
☐ Status Not Specified (SX)
☐ Site Reassessment Start Needed (RN)

Signatures:

State: Date: 03/29/01 RPM/OSC/SAM: Date / /

Prepared by Tri-Cor Industries
03 NOV 00