SAMPLING AND ANALYSIS REPORT
MINERAL COUNTY FAIRGROUNDS
Creede, Mineral County, Colorado

TABLE OF CONTENTS

1.0 INTRODUCTION

The Willow Creek Reclamation Committee was tasked by the Mineral County Fairgrounds Association to conduct environmental sampling at the proposed fairgrounds site. Sampling activities occurred during the months of September and October 2004. Soil samples were collected from the floodplain and middle bench areas of the site. Lead, cadmium, and zinc were the potential contaminants of concern. Lead was determined by X-Ray Fluorescence (XRF) using a Niton XL 309 dual detector for lead in paint and soil with a lead in soil analysis accessory kit following the procedures of EPA SW-846 Method 6200. Confirmation samples were sent to a laboratory for ICP analysis (EPA 6010B). To determine the leachability of metals, soil samples were sent to a lab for Synthetic Precipitation Leaching Procedure (SPLP; EPA Method SW1312) with subsequent ICP analysis for cadmium, lead, and zinc. The WCRC used a Global Positioning System (GPS) to document sample locations and areas sampled.

2.0 OBJECTIVES

The goal of this assessment was to characterize on-site soils to determine if they might pose a health threat to visitors or employees of the proposed fairgrounds, and to ensure that the data generated during this project are adequate to support clean up decisions. The data collected are to be used in conjunction with data previously collected for the other areas of the property.

3.0 BACKGROUND

The Mineral County Fairgrounds Association property consists of 45.89 acres and is located southeast of the junction of Airport Road and Highway 149 west, approximately 0.75 miles outside of Creede, Colorado. The legal description is the Southwest quarter of Section 6, Township 41 North, Range 1 East, and the elevation is approximately 8,640 feet. The property is outside of Creede city limits and is zoned rural by Mineral County. Adjacent property uses include rural agriculture, the local airport, residential, open space, and a recreational vehicle park. The property consists of a raised bench area (approximately 17 acres) sloping down to the alluvial area of the Willow Creek floodplain. Environmental concerns at the site include mine waste and/or mill tailings that were inadvertently deposited on the property from failures of structures or impoundments on adjacent properties. The Property has been and is currently open space. The floodplain and middle bench portions of the property were the focus of this sampling effort, as indicated in Figure 1.

4.0 FIELD OPERATIONS

Field operations were conducted as described below, in accordance with the Sampling and Analysis Plan proposed by the WCRC for sampling to support Voluntary Clean Up Plan development.

4.1 SAMPLING DESIGN

The general sampling design consisted of dividing the total sample area into sectors and collecting a minimum of one composite surface sample from each sector. Surface composite samples were collected from 0 to 2 inches below ground surface (bgs) and consisted of 10 discrete aliquots collected throughout the sector. Sectors sampled for XRF analysis were designed such that no sector exceeded three acres or a maximum dimension of 510 feet. Sectors sampled for SPLP were designed such that no sector exceeded five acres or a maximum dimension of 660 feet.

4.2 SAMPLE LOCATIONS

The sectors to be sampled for XRF and/or SPLP were designed using ArcView and aerial photos of the site. Common surface features and topography were combined within a given sector when possible to reduce the heterogeneity within sectors. Sector corners were located with GPS, and random sample locations were determined based on the coordinates of the sectors boundaries. All sample locations were located in the field with portable GPS, and all relevant site information was recorded in the log book at the time of sample collection.

4.3 SAMPLE LOCATION IDENTIFICATION

The sector name, sample number, date, and time were written on the sample container. Information regarding the details of sample collection at a particular area was entered into the log book. Samples numbers are based on sample location area. Samples were designated as follows:

- The first field is the series of letters that identify the corresponding sector corners, beginning with the northwest corner and following with the northeast, southwest, and southeast corners of the sector.
- The second field, where appropriate, includes a lower case “d” if the sample is a duplicate.

4.4 ANALYTICAL PARAMETERS

Twenty soil samples were analyzed by WCRC using a Niton XL 309 dual detector for lead in paint and soil with a lead in soil analysis accessory kit. Two soil samples collected for XRF analysis were also sent to a commercial laboratory for lead analysis as confirmation of XRF results. Thirteen soil samples were sent to a commercial laboratory for SPLP analysis of cadmium, lead, and zinc. All analyses were conducted within the holding times for the samples. The laboratory data were reviewed by WCRC to ensure that laboratory quality control sample results were within the acceptable limits.

5.0 QUALITY CONTROL REQUIREMENTS

5.1 LABORATORY QUALITY CONTROL

Specific Quality Assurance Procedures were presented in the Sampling and Analysis Plan. Table 1 presents field and laboratory quality assurance results for this sampling event.

5.2 FIELD QUALITY CONTROL

5.2.1 XRF Analysis

All XRF data generated for this project were evaluated using blank and standard checks, field replicates, and laboratory confirmation. Ten percent of the XRF samples were analyzed by an independent laboratory for confirmation of the lead results. The results of these confirmation samples are shown in Table 1. Operation of the field portable XRF followed the manufacturer's specifications.

5.2.2 XRF Sample Preparation and Analysis

XRF sample preparation followed the general guidelines set forth in this section and in the SAP. The soil samples were collected in seal-top plastic bags, homogenized, and labeled with the appropriate sample number. Sample bags were opened and the samples were allowed to air dry for at least 12 hours. When air drying did not remove the all signs of moisture, a portion of the sample was placed in a container for drying on a griddle at 200 degrees. All containers were marked with the sample number. Once the samples were dry, they were sieved using a #10 (2 mm) brass sieve. The sample was not ground or forced through the sieve. The sieved material was again homogenized and spooned into XRF sample cups. Double open ended sample cups were used with 0.2-mil Mylar® film. Sample cups were filled and capped so that there were no wrinkles in the film. A dry decontamination was used on non-dedicated equipment between the preparation of samples to limit cross contamination.

5.2.3 Quality Control Samples

The following samples were collected and/or analyzed as part of the quality control process:

• **Field duplicates**- duplicates were collected at a minimum rate 1 per 10 soil samples.
• **Analytical duplicates**- XRF reading duplicates were run at a minimum rate of 1 per 10 soil samples. XRF reading duplicates were conducted by removing the sample cup from the XRF base, rotating the sample cup 180 degrees, replacing the cup in the XRF base, and taking an XRF reading.
• **Outside laboratory**- Confirmation samples were sent to an independent laboratory at a minimum rate of 1 per 10 soil samples. The prepared XRF sample cup was sent to the lab so that the analyses were run on the same aliquot of sample analyzed by XRF.
• **Blanks and standards**- Prepared blanks and standards were analyzed by XRF before and after the field samples to check the calibration and drift of the machine. Standards were also run along with the samples at a rate of 1 per 10 samples analyzed.

5.2.4 Data Quality Assessment

A calculated relative percent difference (RPD) was used to control sampling uncertainty within a sector. The RPD was calculated from original and duplicate soil samples. Table 1 reports the RPDs for this study. As indicated in the SAP, an RPD value of 50 percent or less for field duplicates suggests an acceptable concentration. An RPD of 30% or less between XRF and laboratory results indicates acceptable comparability.

6.0 ANALYTICAL RESULTS

The results of the field, analytical, and outside laboratory duplicates are presented in Table 1. The sample results are within the acceptable RPD with the exception of the

SPLP results for lead. Lead results are reported in Table 2. Only one sample had concentrations less than 2,920 ppm, the lead concentration for commercial use of the property suggested by the Colorado Department of Public Health and Environment. Specifically, surface concentrations ranged from 2,450 ppm to 11,100 ppm.

SPLP results are presented in Table 3. SPLP concentration ranges were 0.05 to 0.28 mg Cd/L, 0.06 to 2.0 mg Pb/L, and 0.57 to 41 mg Zn/L.

Table 1. Quality control samples collected for the fairgrounds property.

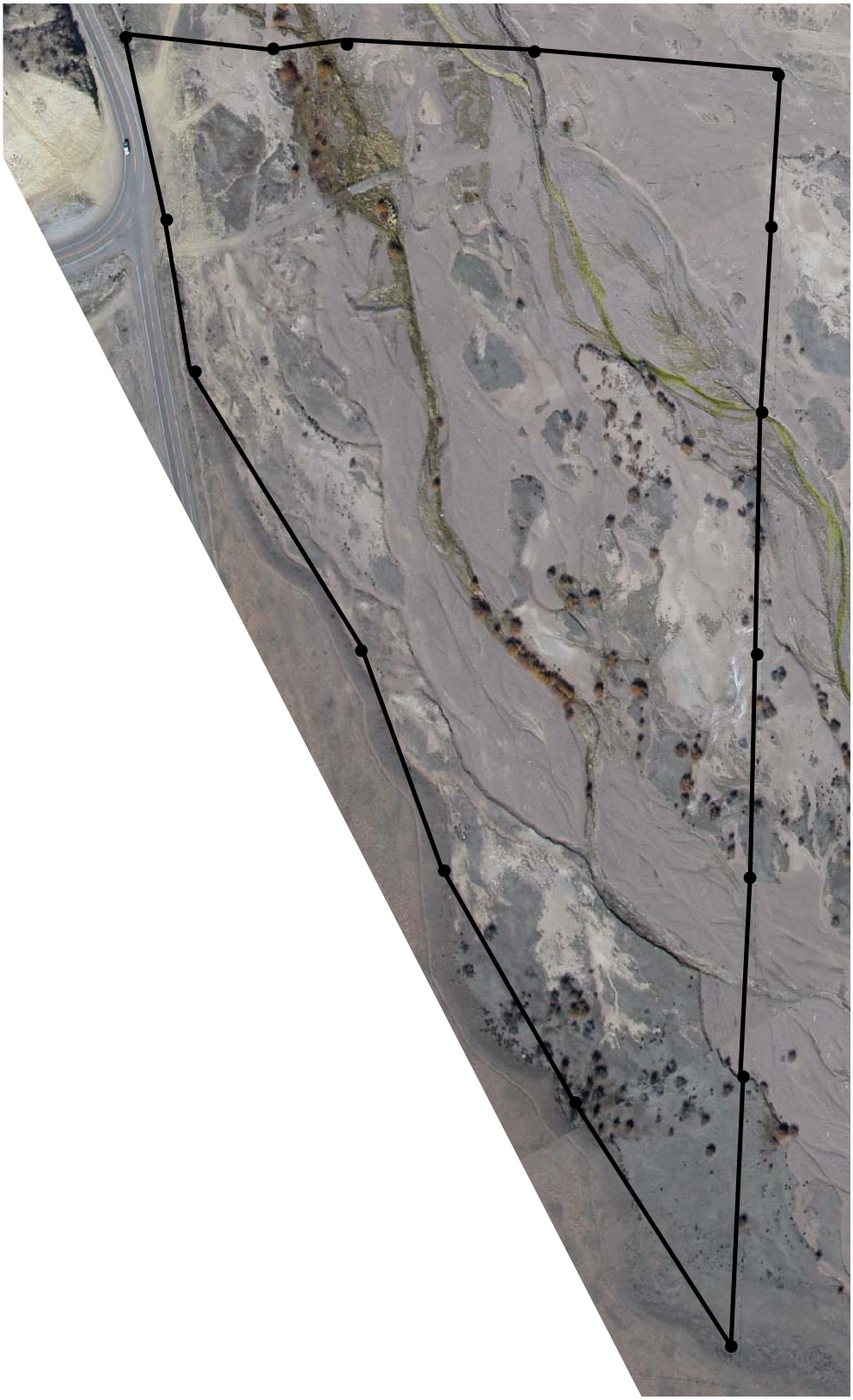
Sample Number	Parameter	Original Sample Value	Duplicate Sample Value	Type of Duplicate	RPD (%)
DEIJ	Lead (ppm)	5,610	4,600	outside lab (ICP)	20
FGKL	Lead (ppm)	3,590	3,720	field duplicate	4
HIMO	Lead (ppm)	3,260	3,240	analytical duplicate	1
QRVW	Lead (ppm)	3,670	3,850	field duplicate	5
RTW	Lead (ppm)	9,890	10,300	analytical duplicate	4
UVXY	Lead (ppm)	9,560	8,000	outside lab (ICP)	18
ABKL	SPLP Cadmium (mg/L)	0.05	0.05	field duplicate	0
ABKL	SPLP Lead (mg/L)	1.3	0.8	field duplicate	52
ABKL	SPLP Zinc (mg/L)	2.5	1.8	field duplicate	33

Table 2. XRF data collected for the fairgrounds property.

Sample Number	Lead (ppm)
ABFG	4,530
BCGH	3,490
CDHI	3,260
DEIJ	5,610
FGKL	3,590
GHLM	3,920
HIMO	3,260
IJO	4,480
KLPQ	7,520
LMQR	3,950
MNRS	5,160
NOST	11,100
PQUV	8,680
QRVW	3,670
RTW	9,890
UVXY	9,560
VWY	3,470
XYZ	2,450

Table 3. SPLP data for samples collected from the fairgrounds property. Parameters analyzed were cadmium (Cd), lead (Pb), and zinc (Zn).

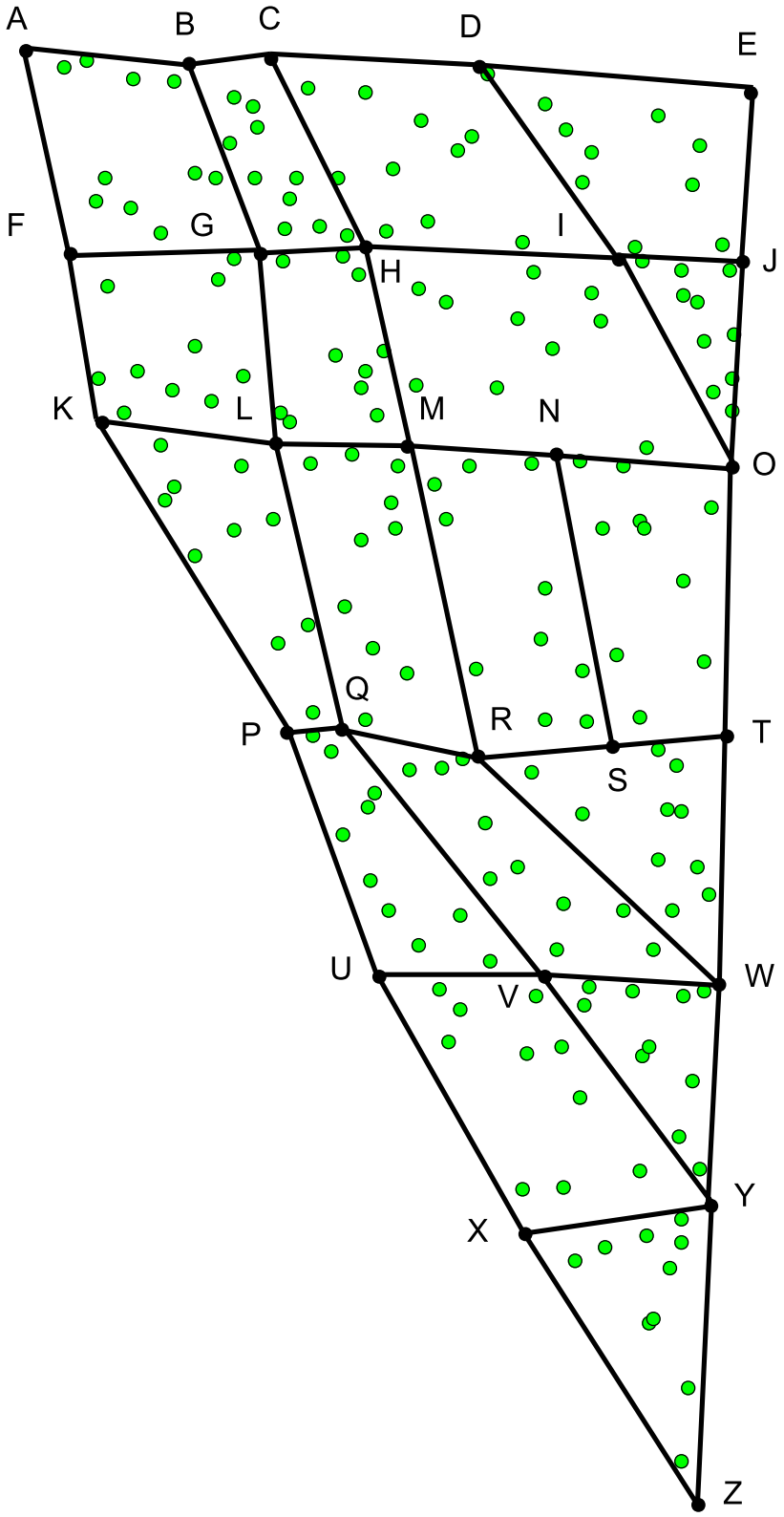
Sample Number	SPLP Cd (mg/L)	SPLP Pb (mg/L)	SPLP Zn (mg/L)
ABKL	0.05	1.30	2.50
BCLM	0.05	1.20	1.90
CDMO	0.05	1.30	4.01
DEO	0.05	2.00	5.90
KMPR	0.05	1.20	4.50
MORT	0.09	1.90	13.00
PQUV	0.05	1.40	5.40
QRVW	0.05	1.90	4.00
RTW	0.28	0.59	41.00
UVXY	0.05	1.40	5.30
VWY	0.05	1.50	2.60
XYZ	0.05	0.06	0.57



50 0 50 100 150 Meters

N
W E
S

Figure 1. Sampling boundary of the fairgrounds property.

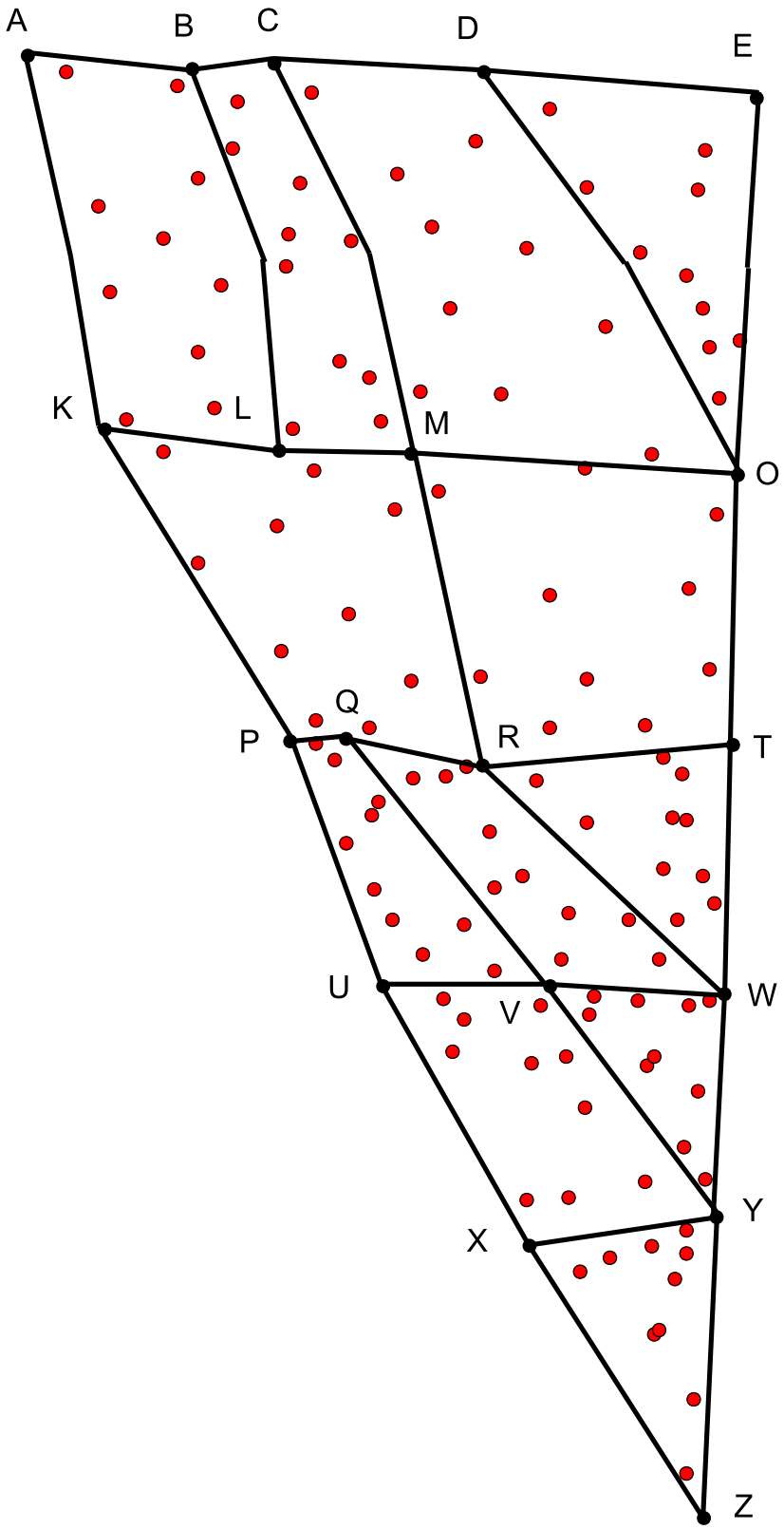


XRF sample points

50 0 50 100 150 Meters

N
W E
S

Figure 2. XRF sectors and sample points for the fairgrounds property.



SPLP sample points

50 0 50 100 150 Meters

N
W E
S

Figure 3. SPLP sectors and sample points for the fairgrounds property.