

VOLUNTARY CLEANUP PLAN
APPLICATION FOR SUBAREAS 1B
AND 1C FOR THE CREEDE AIRPORT
CORNER SITE, CREEDE, MINERAL
COUNTY, COLORADO

To be submitted to:
Colorado Department of Health and Environment

On behalf of:
Willow Creek Reclamation Committee
2223 Main Street
Creede, Colorado 81130

March 19, 2004

URS

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This section describes the objective of this application and explains the document organization.

1.1 REPORT OBJECTIVES

The Mineral County Fairgrounds Association (MCFA) is submitting this voluntary cleanup application (VCUP) to the Colorado Department of Health and Environment (CDPHE) in accordance with the State of Colorado Voluntary Cleanup and Redevelopment Act (VCRA) (CRS 25-16-301). The purpose of this document is to supply the CDPHE with adequate information for making a decision concerning VCUP of the Subareas 1B and 1C (Property) located at the Creede Airport Corner Site in Creede, Colorado (Figure 1-1). Soil at the Property contains lead concentrations above CDPHE's proposed industrial land use cleanup level of 400 parts per million (ppm). The MCFA's objective is to remediate the Site, which will serve as the Mineral County Fairgrounds for Mineral County, Colorado.

1.2 REPORT ORGANIZATION

The organization of this document generally follows the criteria in the VCRA application checklist. Appendix A presents the VCRA checklist, which has been annotated to provide the page number for the criteria discussed in the following sections.

This report is organized as follows:

- **Section 1 – Introduction:** Summarizes the application purpose and objectives.
- **Section 2 – General Information:** This section contains general information concerning the Property, including information on the Property's owner, location, and contamination type and source.
- **Section 3 – Program Inclusions:** The VCRA checklist includes criteria for determining the eligibility for inclusion under the VCUP program. This section addresses those criteria.
- **Section 4 – Environmental Assessment:** This section addresses the information requested in the VCRA checklist concerning the Property's history and physical characteristics.
- **Section 5 – Previous Investigations:** This section summarizes the previous assessment and investigations conducted at the Property.
- **Section 6 – Extent of Contamination:** This section summarizes the nature and extent, and pathway analysis of existing environmental conditions at the Property.
- **Section 7 – Applicable Standards and Risk:** This section summarizes the applicable standards and risk associated with this VCRA application.
- **Section 8 – Remediation:** This section presents a summary of the proposed remediation approach to be performed at the Property.
- **Section 9 – Remediation Sampling Program:** This section presents a summary of the proposed remediation sampling program.
- **Section 10 – Schedule**
- **Section 11 – Limitations**

- **Section 12 – References**

The document appendices contain supporting information as follows:

- Appendix A – VCRA Checklist
- Appendix B – Previous Assessment and Investigation Reports
- Appendix C – VCUP Application Submitted by Navajo Development, LLC
- Appendix D – Analytical Soil Data and Information

In addition, in preparing this VCUP several documents have been used for reference:

- Airport Corner Land Characterization, Creede, Colorado (WCRC, 2001)
- Targeted Brownfields Assessment – Airport Corner Site , Creede, Colorado (CDPHE, 2002)
- VCUP Application – Airport Corner Site, Creede, Colorado (EnviroGroup, 2002)

These documents have been previously submitted for review by CDPHE as part of a VCUP application submitted by Navajo Development, LLC in 2002. Therefore, where applicable those documents have been referenced, but to limit duplication in CDPHE records they have not been included as appendices to this VCUP.

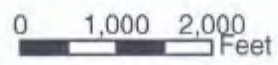


Figure 1-1

This section contains general information concerning the Property, including information on the Property's owner, location, and contamination type and source.

2.1 PROPERTY AND OWNER IDENTIFICATION

The MCFA is submitting this VCUP application by permission of John Parker dba Navajo Development Company (aka Navajo Development, LLC), who has written takeover agreement with Creede Mines, Inc (Charles B. Van Duzer), the owner of Subareas 1B and 1C.

The contact information for MCFA is:

Mineral County Fairgrounds Association
Attn: Jenny Inge
P.O. Box 61
Creede, CO 81130

The contact information for John Parker dba Navajo Development Company:

John Parker dba Navajo Development Company
1140 Cherokee Suite 801
Denver, CO 80204

The contact information for Creede Mines, Inc. is:

Creede Mines, Inc
Attn: Charles B. Van Duzer
23617 Sandus Cemetery Rd.
Magnolia, TX 77355

2.2 PROPERTY LOCATION

The Property is located two miles south of Creede, Mineral County, Colorado in the vicinity of the Mineral County Airport as shown on Figure 1-1. The legal description of the Property is Southwest Quarter of Section 6, Township 41 North, Range 1 East. The Property consists of an upper bench and a lower bench; with the upper bench being the terraces of Willow Creek and the lower bench being the floodplain of Willow Creek as shown of Figure 1-1.

2.3 TYPE AND SOURCE OF CONTAMINATION

Lead-impacted soil is the primary contaminant of concern at the Property. The soils have been sampled and analyzed for metals as part of several environmental assessments and investigations conducted at the Property. Elevated metal concentrations were found in many portions of the Property, with most elevated concentrations occurring in the Willow Creek floodplain. The source of elevated metals is thought to be tailing that has been transported via a wooden flume and ditch from the Humphries Mill.

2.4 CURRENT LAND USE

The land is currently used as Open Space.

2.5 PROPOSED LAND USE

The MCFA is planning on the multi-purpose development of the Mineral County Fairgrounds at the Property.

The VCRA checklist includes criteria for determining the eligibility for inclusion under the VCUP program. This section addresses those criteria.

3.1 OWNERSHIP

The Property is owned by Creede Mines, Inc. This property is under a written takeover option by John Parker dba Navajo Development Company (aka Navajo Development, LLC), and this VCUP application is being submitted by the MCFA, as future owners, and by permission from John Parker. This property will be dedicated to the Mineral County Fairgrounds Association (MCFA) once the property has been transferred to John Parker.

3.2 PREVIOUS RELEASES OR NOTIFICATIONS

No notifications have been required to Mineral County emergency response personnel under the Emergency Planning and Community-Right-to-Know Act (aka Superfund Amendments and Reauthorization Act Title III). In addition, no documentable spills or accidental release of hazardous substances requiring regulatory notification have occurred at the Property. However, it is understood that during the period of mining operations a flume was constructed to transport tailing material to properties to the immediate west. On occasion the flume was breached or broken and some tailing material was discharged onto the Property.

3.3 WATER QUALITY CONTROL DIVISION

The Property is not subject to an order issued by or an agreement (including permits) with the Water Quality Control Division pursuant to Part 6 of Article 8 of Title 25 CRS. The lower bench of the Property is located in the 100-year and 500-year floodplain as designated by the Federal Emergency Management Agency (FEMA).

3.4 TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTE

The Property does not have a permit or interim status pursuant to Part 3 of Article 15 of Title 25 CRS for treatment, storage or disposal of hazardous waste.

3.5 UNDERGROUND STORAGE TANKS

No underground storage tanks are in use or known to exist on the Property. The Property is not subject to the provisions of Part 5 of Article 20 of Title 8 (Underground Storage Tanks) CRS or of Article 18 of Title 25 (RCRA) CRS.

3.6 NATIONAL PRIORITIES LIST OF SUPERFUND SITES

The Property is not listed as a Superfund site under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) (EPA, 2003).

This section addresses the information requested in the VCRA checklist concerning the Property's history and physical characteristics. The information in this section was acquired from the WCRC, Colorado Department of Health and Environment (CDPHE) Targeted Brownfields Assessment (TBA), and EnviroGroup Limited (EnviroGroup) assessment and investigation reports. Information was also derived from the VCUP application prepared by EnviroGroup and submitted by the Navajo Development LLC in 2002.

4.1 PROFESSIONAL QUALIFICATIONS

Qualified environmental professionals previously conducted environmental assessments and investigations of the Property and adjacent properties. URS Corporation (URS) has prepared this VCRA application on behalf of the MCFA. URS is considered one of the top engineering-consulting firms in the world, and offers a diversity of professional services to a wide variety of industries. Qualifications of URS personnel used to prepare this VCRA application were established by education, training, and experience in the conducting environmental investigations and remediation.

4.2 SITE LOCATION

As indicated previously, the Property is located two miles south of Creede, Mineral County, Colorado in the vicinity of the Mineral County Airport as shown on Figure 1-1. The legal description of the Property is Southwest Quarter of Section 6, Township 41 North, Range 1 East. The Property consists of an upper bench and a lower bench; with the upper bench being the terraces of Willow Creek and the lower bench being the floodplain of Willow Creek as shown of Figure 1-1.

4.3 OPERATIONAL HISTORY

4.3.1 History of Operations

The Property has been primarily used as open space. Regionally, the area is one of the major mining camps in Colorado, with at least 29 major mining sources within six square miles of the Property. Most of the mines were developed for silver extraction and were worked from the late 1800's to as recently as 1976. Milling activities occurred at the former Humphries mill, which was located along the East and West Forks of Willow Creek and north of Creede (CDPHE, 2002).

4.3.2 Known Releases of Hazardous Substances

There are no known documentable releases of hazardous substances at the Property. However, contaminated soil is believed to have originated from over bank deposits of tailing materials transported via Willow Creek and the breach of a wooden flume and ditch system directly from Humphries Mill.

Previous site characterization investigations include the WCRC investigation and the TBA conducted by CDPHE. These investigations identified elevated soil metals concentrations at the Property associated with this VCUP. Metals concentrations in Subarea 1C were found to be

below the residential/unrestricted land use for the CDPHE Soil Remediation Objectives (SRO) for lead, the indicator contaminant for this VCUP. However, lead concentrations in Subarea 1B, mostly located in the Willow Creek floodplain, exceed the commercial land use SRO of 2920 ppm.

4.3.3 Known Hazardous Substances

Based on the assessments and investigations performed by WCRC, CDPHE, and EnviroGroup, lead is the primary indicator hazardous chemical of concern at the Property. Lead is considered a toxic heavy metal that can be leached from solid lead fragments and become a toxic salt. Other contaminants of concern at the site include arsenic, cadmium, and zinc; and it is assumed that lead could serve as an appropriate indicator contaminant for these other metals. Applicable standards and risk are presented in Section 7.0.

4.3.4 Wastes Generated by Current Activities

There are no current activities generating wastes at the Property. There have been no known manifested hazardous material shipments from this Property.

4.3.5 Permits

There have been no known permits issued for hazardous materials operations at this Property. A VCUP application was submitted to the CDPHE by John Parker dba Navajo Development Company (aka Navajo Development, LLC) in December 2002 for the parcels 1, 2, 3, 4, and 5 including Subareas 1C and the portion of 1B above the Willow Creek floodplain.

4.3.6 Land Use and Zoning

Subareas 1B and 1C have been zoned for rural land use. The area is currently used as open space. Subareas 1B and 1C are approximately 39.3 and 6.6 acres, respectively. The floodplain portion of 1B makes up 29 of the 39.3 acres, with the remaining 10.3 acres making up the bench portion of Subarea 1B.

4.4 PROPERTY PHYSICAL CHARACTERISTICS

4.4.1 Topography

The Property is located on a relatively flat field that slopes gently toward the south and southeast along the Rio Grande Valley. Elevations at the property range from approximately 8,600 feet above mean sea level (msl) to 8,680 feet above msl.

4.4.2 Surface Water

Several braids of Willow Creek run through the Property and converge southeast of the Property near the confluences with the Rio Grande River. Environmental concerns with Willow Creek and the portions flowing through the Property will not be addressed by this VCUP, since the

impacts to the creek originate upstream of the Property. It is assumed that contamination from the Property is not further degrading water quality of Willow Creek.

4.4.3 Other Characteristics

The lower bench of the Property is located in the 100-year and 500-year floodplain. No other major physical characteristics of concern exist at the Property including: groundwater and monitoring and supply wells; facility process units and loading docks; chemical and/or fuel transfer and pumping stations; railroad tracks and rail car loading areas; spill collection sumps and/or drainage collections areas; wastewater treatment units; surface and storm water runoff retention ponds and discharge points; building drainage or wastewater discharge points; above or below ground storage tanks; above and below ground piping; air emission control scrubber units; water cooling systems or refrigeration units; sewer lines; french drain system; water recovery sumps and building foundations; surface impoundments; waste storage and/or disposal areas/pits, landfills; chemical or product storage areas; leach fields; dry wells or waste disposal sumps.

4.4.4 Groundwater

Groundwater in the vicinity of the Property typically occurs in the volcanic bedrock and alluvial aquifers, and flows under water-table or unconfined conditions. The water level in the alluvial aquifer is generally around 30 to 35 feet bgs. Groundwater in the alluvial aquifer is hydraulically connected to the bedrock aquifer and Rio Grande River flow system. Numerous groundwater supply wells are installed in the alluvial aquifer in the vicinity of the Property. However, groundwater supply wells downstream of the Property have been sampled and analytical results have indicated the water is free of contamination (CDPHE 2002).

Groundwater analytical data is not available for the Property since previous investigations have focused on metals in soils. Previous attempts to sample groundwater failed due to drilling limitations. It is assumed that groundwater has not been impacted from the contaminated soil, since most of the elevated metals concentrations have been found within the top 6 inches of the soil profile. Because the mobility of lead in unsaturated soil is low and the groundwater is typically encountered at approximately 34 feet bgs, the potential for groundwater contamination at the Property is considered to be low. Therefore, further evaluation and evaluation of the groundwater is not considered to be required.

This section summarizes the previous assessment and investigations conducted at the Property. The investigation results have indicated that the primary concern at the Site is lead in the surface soil. These assessment and investigations have included:

- Airport Corner Land Characterization, Creede, Colorado (WCRC, 2001)
- Targeted Brownfields Assessment – Airport Corner Site, Creede, Colorado (CDPHE, 2002)
- VCUP Application – Airport Corner Site, Creede, Colorado (EnviroGroup, 2002)

The following sections summarize these assessments and investigations. Section 6 presents a discussion of the extent of contamination.

5.1 WCRC AIRPORT CORNER LAND CHARACTERIZATION

In September 2000, the U.S. Army Corps of Engineers, Albuquerque District contracted the services of IS2e Inc. of Albuquerque, New Mexico to investigate soil lead concentrations at the property using X-ray fluorescence (XRF) equipment. A total of 13 soil samples were shot using XRF in Subarea 1B, and none were shot in Subarea 1C. Lead concentrations in Subarea 1B ranged from approximately 287 to 23,707 ppm, which exceeds the CDPHE SRO for residential/unrestricted land use lead concentrations of 400 ppm. The XRF data for samples shot in Subarea 1B are presented in Table 5-1 and sample locations are shown in Figure 5-1.

Elevated soil metals concentrations were found in grassy areas as well as in bare areas that were suspected to contain phytotoxic soil. Lead and arsenic were found to be positively correlated (i.e., high levels of arsenic were found to be closely associated with correspondingly high levels of lead). As lead increases the levels of cadmium and zinc also tend to increase, although not as closely as arsenic. Because of these relationships, and its ubiquitous nature, lead was determined to be an effective indicator of elevated concentrations of arsenic, cadmium, and zinc.

5.2 SUMMARY OF TARGETED BROWNFIELDS ASSESSMENT

The CDPHE conducted a TBA of the Property (CDPHE 2002). CDPHE collected a total of 248 soil samples, of which 54 were collected on the upper bench of Subareas 1B and 1C, as shown on Figure 5.2. Soils samples were collected at three intervals:

- 0 to 6 inches bgs
- 12 to 16 inches bgs
- 30 to 36 inches bgs

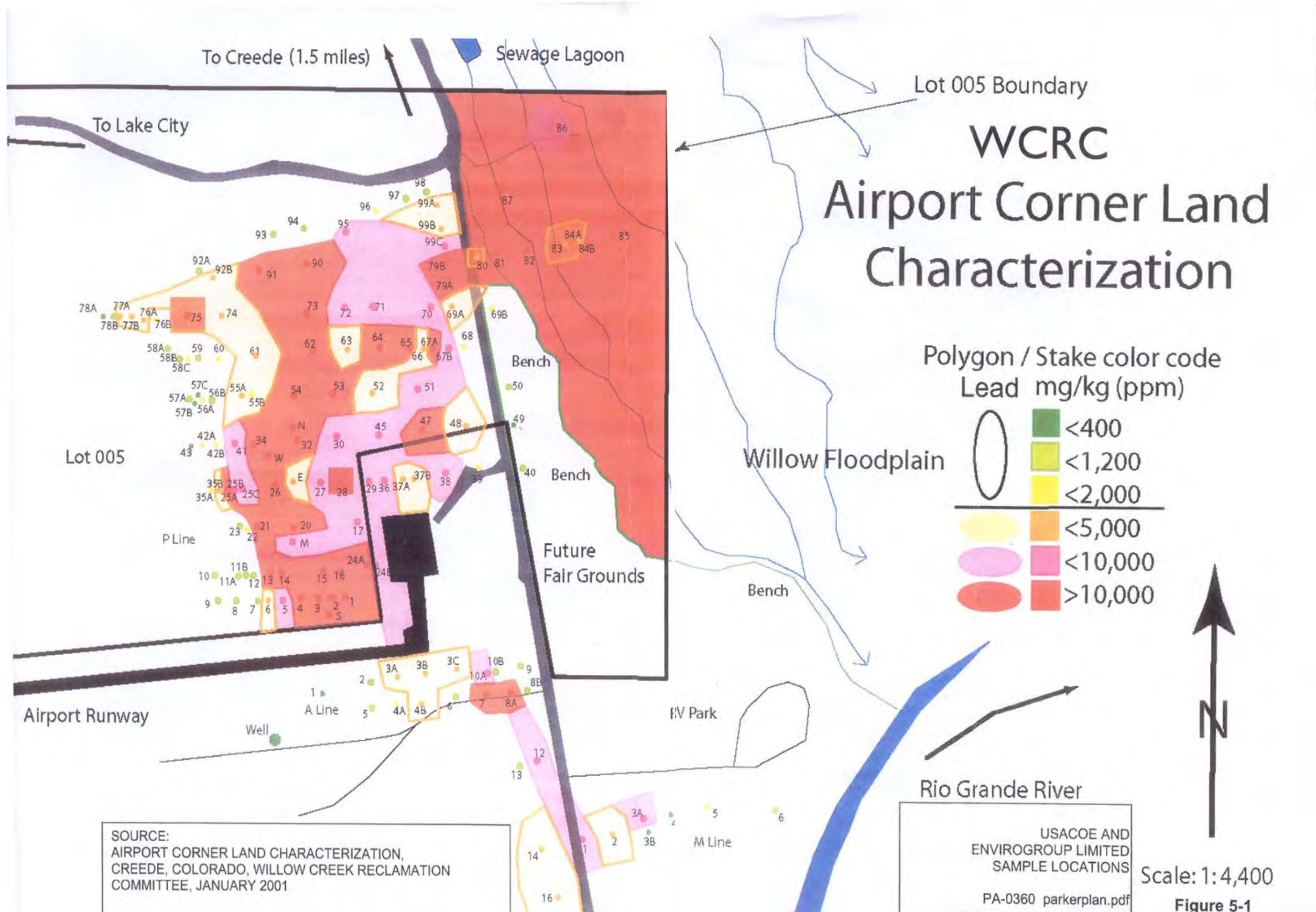
The samples were analyzed for arsenic and lead (Tables 5-2, 5-3, and 5-4). Lead concentrations ranged from:

- 33 to 2500 ppm from 0 to 6 inches bgs;
- 11 to 390 ppm from 12 to 16 inches bgs; and
- 9.4 to 140 ppm from 30 to 36 inches bgs.

Arsenic concentrations ranged from:

- 1.4 to 44 ppm from 0 to 6 inches bgs;

- 1.1 to 25 ppm from 12 to 16 inches bgs; and
- 2.8 to 29 ppm from 30 to 36 inches bgs.



Targeted Brownsfield Assessment Sample Location Map



900 0 900 1800 Feet



- Site boundary
- Sample Locations

Figure 5-2

Table 5-1
XRF Lead Concentration Data
(WCRC Airport Corner Land Characterization)
All concentrations in ppm

Sample Location ID	Lead
40	943
49	287
50	1182
69B	1954
80	3963
81	11,288
82	12,815
83	6454
84A	6817
84B	23,707
85	15,800
86	7682
87	10,614

Table 5-2
Lead and Arsenic Concentrations in Surface Soil (0 to 6 inches bgs)
(CDPHE TBA Investigation)
All concentrations in ppm

Sample Location ID	Arsenic	Lead
EC01	24	810
EC02	14	400
EC03	21	350
EC04	11	140
EC05	20	190
EC06	16	170
EC07	21	320
EC08	1.4	33
EC09	19	260
EC10	8	71
EC11	12	65
EC12	7.9	170
EC13	8.7	70
EC14	8.8	70
EC15	9.9	170
EC16	12	190
EC17	9.8	160
EC18	9.7	160
EC19	11	120
EC20	11	150
EC21	14	280
EC22	12	250
EC23	33	2500
EC24	44	1900

Table 5-3
Lead and Arsenic Concentrations in Soil (12 to 16 inches bgs)
(CDPHE TBA Investigation)
All concentrations in ppm

Sample Location ID	Arsenic	Lead
EC01	8.9	11
EC02	13	11
EC03	10	66
EC04	19	43
EC05	7.1	24
EC06	3.1	20
EC07	3.5	21
EC08	3.2	16
EC09	18	46
EC10	6.2	32
EC11	25	18
EC12	4.3	14
EC13	1.1	14
EC14	6	26
EC15	6.9	37
EC16	12	33
EC17	7.9	16
EC18	13	44
EC19	8.4	39
EC20	5.2	17
EC21	4.7	13
EC22	9.3	73
EC23	10	40
EC24	15	390

Table 5-4
Lead and Arsenic Concentrations in Soil (30 to 36 inches bgs)
(CDPHE TBA Investigation)
All concentrations in ppm

Sample Location ID	Arsenic	Lead
EC02	3	12
EC08	16	140
EC13	29	68
EC16	2.8	9.4
EC21	12	31

5.3 ENVIROGROUP INVESTIGATION

In July 2002, EnviroGroup collected 85 soil samples over the 0- to 2-inch depth interval from Subarea 1C and parcels 2, 3, and 4. Figure 5-3 shows the sample locations in Subarea 1C. Three of the 85 soil samples were collected in Subarea 1C as part of the investigation. These limited data indicate a range from 210 to 290 ppm of lead concentrations in the soil, which are below the CDPHE SRO for commercial and residential/unrestricted land use. None of the samples collected in Subarea 1C for arsenic in soil exceeded the 70 ppm standard established by the CDPHE. The arsenic concentration in Subarea 1C was approximately 21 ppm. The analytical results for the soil samples are summarized in Table 5-5.

Table 5-5
Summary of Analytical Results for Subarea 1C¹
(EnviroGroup Investigation)
All concentrations in ppm

Sample ID	Arsenic	Lead
1	21	290
2	21	210
3	21	270

¹Source: EnviroGroup 2002

This section summarizes the nature and extent, and pathway analysis of existing environmental conditions based on review of existing information, as presented in Sections 2.0 and 3.0.

6.1 SOIL

Metal concentrations above the residential/ unrestricted land use recommended SRO for lead of 400 ppm have been detected in Subarea 1B and the floodplain. Metal concentrations in Subarea 1C are below the recommended SRO.

The investigation conducted by EnviroGroup [2002] collected samples from Subarea 1C. Lead concentrations, as presented in Table 5-5, ranged from 210 to 290 ppm; and arsenic concentrations were estimated to be approximately 21 ppm, which is below the 70 ppm recommended SRO. Based on these results, Subarea 1C will be designated clean and no further action will be required.

Based on the results from the CDPHE TBA and WCRC Airport Corner Land Characterization, portions of the floodplain and Subarea 1B have lead concentrations that exceed the 400 ppm recommended SRO for residential/unrestricted land use. The total area of elevated metal concentrations was estimated to be approximately 32.5 acres. This area will be addressed in the remediation section of this VCUP application.

6.2 GROUNDWATER

Groundwater analytical data is not available for the Property since previous investigations have focused on metals in soils. It is assumed that groundwater has not been impacted from the contaminated soil, since most of the elevated metals concentrations have been found within the top 6 inches of the soil. Because the mobility of lead in unsaturated soil is low and the groundwater is typically encountered at approximately 34 feet bgs, the potential for groundwater contamination on the "upper bench portion" of the Property is considered to be low. The proximity of shallow ground water and lack of information regarding depth of soil contamination within the floodplain portion of the property may necessitate further evaluation.

Groundwater downstream of the Property has been collected from off-site groundwater supply wells. Based on the analytical data available, metal concentrations in the groundwater do not exceed applicable criteria (CDPHE 2002). Groundwater is assumed to discharge into Willow Creek and the Rio Grande River.

6.3 SURFACE WATER

Several braids of Willow Creek run through the Property, and converge southeast of the Property near the confluences with the Rio Grande River. Environmental concerns with Willow Creek and the portions flowing through the Property will not be addressed by this VCUP, since the impacts to the creek originate upstream of the Property. It is assumed that contamination from the Property is not further degrading water quality of Willow Creek. Water quality data for Willow Creek at the Property is not available.

This section summarizes the applicable standards and risk associated with this VCUP application.

7.1 APPLICABLE STANDARDS

Soil remediation at the Property will be conducted in accordance with the Colorado VCRA (CRS 25-16-301) requirements. For a VCUP to be approved, it is necessary to demonstrate that it will attain a degree of cleanup and control of hazardous substances that complies with the promulgated applicable state requirements, regulations, criteria, or standards. Additionally, it must be shown that the Property does not present an unacceptable risk to human health or the environment based upon the Property's current uses and future uses proposed by the Property owners.

The CDPHE developed recommended SRO, which are applicable to this VCUP application. As established by the VCUP submitted by Navajo Development, LLC, the CDPHE established an action level of 70 ppm for arsenic in soil for all land uses. Table 7-1 summarizes the soil remediation standards for the metals of concern at the Property associated with this VCUP application.

Table 7-1
Summary of Soil Remediation Standards¹
All concentrations in ppm

Description	Arsenic	Lead
Residential/Unrestricted Land Use	70	400

¹CDPHE, 2001.

The objective of the remediation plan will be to treat soil that contains lead concentrations above the 400 ppm and/or arsenic concentrations above 70 ppm using a stabilization/capping approach to reduce the mobility of metals in the soil. Since sensitive populations (e.g., young children and elderly) will be utilizing the site, under the proposed SRO policy the site would be classified as residential/unrestricted land use. In addition, to avoid additional land restrictions the residential/unrestricted land use recommended SRO's for lead were selected as recommended by MCFA.

7.2 RISK

There are a number of site-specific factors that affect the relationship between soil lead concentrations, bioavailability, and resultant blood levels. The Property is planned for multi-purpose land use, which can be classified as residential/unrestricted land use. A site-specific health and safety plan will be developed to mitigate construction and operational risks. Human health is a potential issue since the Property will be developed as fairgrounds. Workers at the Property face the most risk due to longer-term exposure compared to the transient community visiting the fairgrounds. An objective of the remediation will be to control the potential for

exposure of all users of the Property and the remediation measures will be designed and implemented to be protective of human health and the environment.

This VCUP will address the lower bench area of the Willow Creek floodplain and 3.5 acres at the north end of the bench. Data collected from Subarea 1B has indicated elevated levels of mining-related metals in the soil. Data collected on the lower bench is of a limited area, and all samples collected indicate that metals contamination exists; therefore, for the purposes of this VCUP, it is assumed that the soil in the floodplain contains elevated concentrations of mining-related metals that require remediation. The analytical results from Subarea 1C were at levels below the recommended SRO, and it is not considered that remediation of Subarea 1C is required.

This section summarizes the proposed remediation approach to be performed at the Property. Following acceptance of this VCUP application, a detailed work plan will be prepared for remediation activities. Upon review of the previously conducted environmental investigations related to Subareas 1B and 1C and the lower bench, two issues requiring environmental cleanup have been identified for multi-purpose use of the property. The issues are:

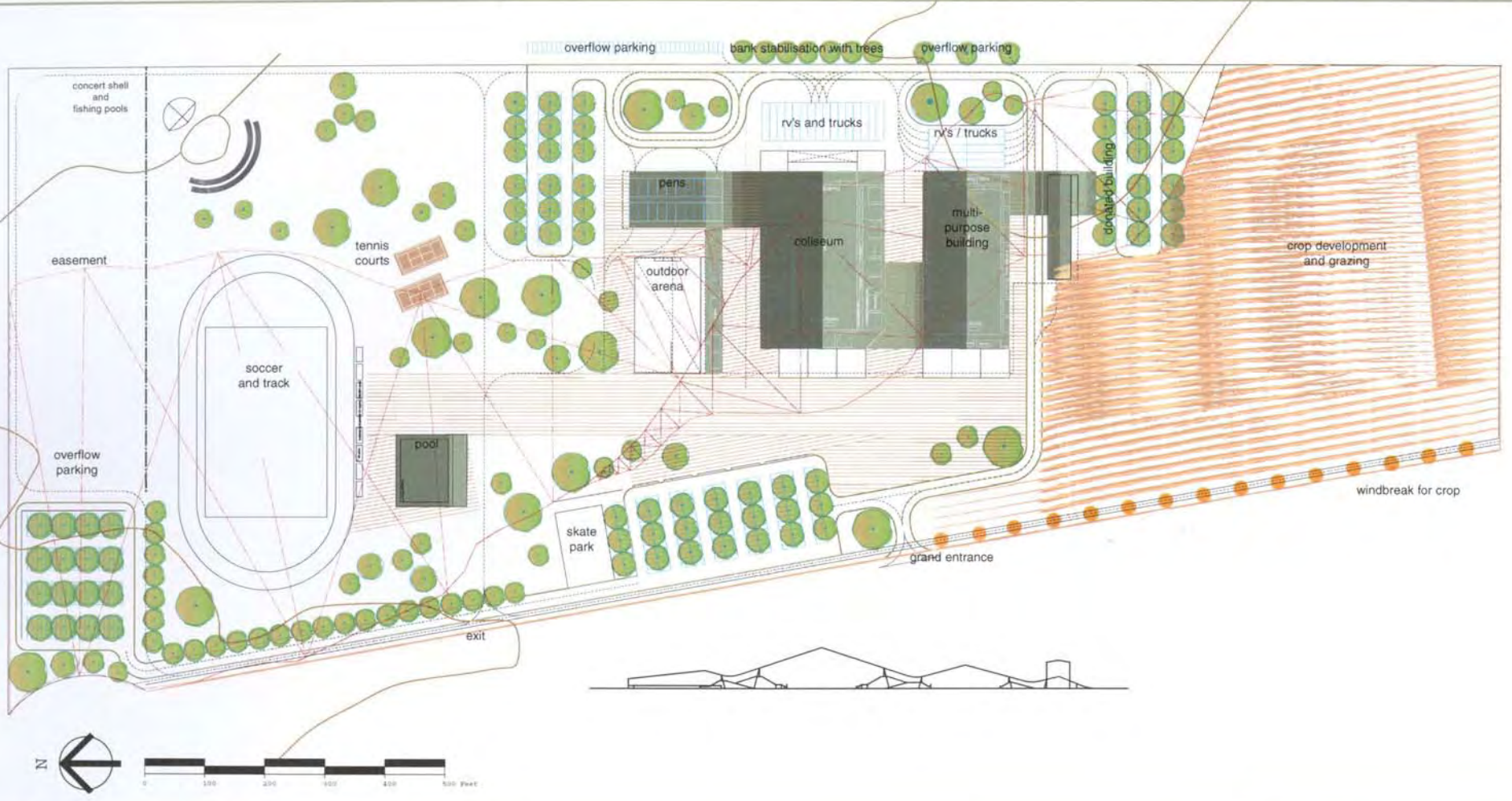
- Metal concentrations in shallow soils
- The potential for erosion and transport of contaminated surface soils

8.1 REMEDIATION APPROACH

This remediation will address metals concentrations in shallow soils. This VCUP proposes soil stabilization (i.e., phytostabilization) and institutional controls to reduce potential exposure to, as well as the mobility of, soil with elevated lead concentrations greater than 400 ppm and/or soil arsenic concentrations greater than 70 ppm (average).

The implementation of this VCUP and the development of the Property associated with this VCUP will be concurrent and interrelated. At this time there are two development schemes, Scheme 1 and Scheme 2, that have been developed by 51% Studios Limited for the MCFA. These Schemes are presented in Figure 8-1 and 8-2. Based on the development plans proposed for the two Schemes, the remediation activities will comprise of the following measures:

- Using erosion and sediment controls during VCUP operations to minimize the further movement of soils with elevated metals concentrations.
- Using phytostabilization (planting of preferential plant species) to stabilize contaminated soils, reduce erosion, and reduce infiltration (through root uptake of water).
- Capping a majority of the Property where soil lead concentrations are greater than 400 ppm and/or arsenic concentrations are greater than 70 ppm. Capping will involve strategic planning with landscape architects, building architects, site developers, and engineers to determine what capping alternative will be employed (i.e., asphalt parking lots and trails, sod, clean fill material, and structures).
- Importing and placing non-contaminated soils (clean fill material) in areas where sod, shrubs, and trees are to be placed. The imported soil will enhance stabilization, promote the growth and density of the landscape features (serving as phytostabilization media), and further protect potential receptors. It is anticipated that these areas will be covered with between 6 to 12 inches of soil. The landscape features will also limit human exposure to the contaminated soils. The import material will have lower metal concentrations and lower permeability than the native materials.

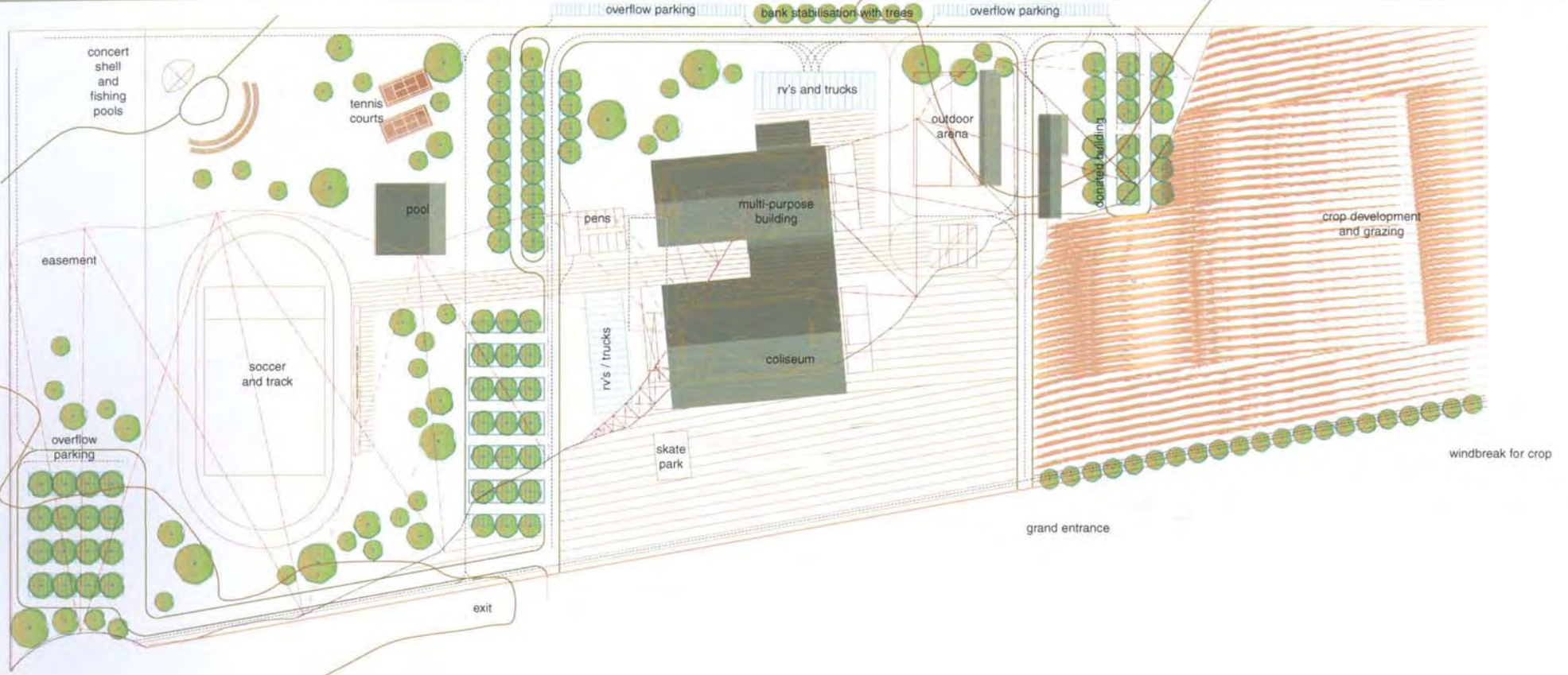


Mineral County
Fairgrounds Association



51% studios ltd

Figure 8-1



Mineral County
Fairgrounds Association

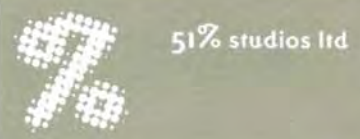


Figure 8-2

- Placing non-contaminated road base and asphalt in areas where parking lots are planned. Asphalt is less permeable than gravel and will limit the infiltration and limit erosion from runoff. A stormwater collection system will be incorporated to intercept runoff the parking lot. The asphalt will also limit exposure to the contaminated soils.
- Capping contaminated soils using the proposed structure in areas where buildings and other structures are planned. Specific design considerations (e.g., slab-on-grade) will be incorporated as possible. These design considerations can reduce the need to disturb soils to construct foundations. As such, these structures will in effect serve as capping measures since they will prevent the transportation and erosion of soil and will limit human exposure to contaminated soils.
- Revegetate excavated and graded areas. The site will be graded to control stormwater runoff to reduce erosion and infiltration.
- Develop a soil management plan if the excavation and relocation of soils containing metal concentrations greater than 400 ppm and/or arsenic concentrations greater than 70 ppm is required.
- Adopt and implement appropriate institutional controls to address potential future site categories. Appropriate institutional controls may include restricted groundwater use and restricted site development.

The remediation approach is defined by three main types of activity (as described in Sections 8.1.1, 8.1.2, and 8.1.3):

1. Soil Remediation – Capped by Structures
2. Soil Remediation – Capped by Low Permeability Surfaces
3. Soil Remediation – Stabilization by Landscaping (Phytostabilization)

The implementation of each activity is directly related to the two proposed development Schemes. These two Schemes are shown as conceptual site drawings in Figures 8-1 and 8-2. Soil remediation, capped by structures, corresponds to areas covered by buildings and other construction as shown on Figures 8-1 and 8-2. Soil remediation, capped by low permeability surfaces, corresponds to areas covered by low permeability surfaces, for example the parking lots, some pathways, etc, as shown on Figures 8-1 and 8-2. The remaining areas will either be developed by landscaping or left as open development and grazing. For each of these scenarios, the remediation technology proposed is phytostabilization. The scope of landscaping and the open development and grazing areas are shown on Figures 8-1 and 8-2.

Based on review of the existing environmental information and assessments, the area with lead concentrations greater than 400 ppm and/or arsenic concentrations greater than 70 ppm for VCUP Subareas 1B was estimated to be approximately 32.5 acres. The soil volume was not estimated since the proposed remediation strategy will include capping and phytostabilization. If significant excavation activities are anticipated during fairground construction activities, volumes will be estimated prior to these activities and a soil management plan will be developed. Table 8-1 summarizes the estimated areas for each remedial action that is proposed.

**Table 8-1
Estimated Remedial Surface Area (Subarea 1B)**

	Total Surface Area (Approximate)	Estimated Area to be Capped by Structures	Estimated Area to be Capped by Asphalt	Estimated Area to be Remediated by Phytostabilization
	(acres)	(acres)	(acres)	(acres)
Lower Bench	32.5	8	8.5	16

8.1.1 Soil Remediation – Capped by Structures

The Property will be developed into the Mineral County Fairgrounds. Several large structures are planned for the site. These structures, depending on design, will effectively serve as a cap (i.e., preventing exposure to metal contaminated soil and preventing further erosion and transportation of metals). Coordination between the MCFA, architects, and engineers will be necessary during the design phase to incorporate the structures as a capping measure. Structure design consideration should include:

- Slab-on-grade construction to minimize soil disturbances and volumes of soil generated through excavation for foundations of buildings.
- Stormwater collection systems that prevent infiltration and erosion from runoff (i.e., gutters and collection drains).
- Use of a public wastewater system to prevent the use of a septic system that may promote the mobility of metals towards groundwater/surface water systems.
- Utility line placement in common trenches to minimize excavation of contaminated soil.

8.1.2 Soil Remediation – Capped by Low Permeability Surfaces

Several parking lots and pathways are planned for throughout the fairgrounds. In areas where soil metal concentrations are elevated, capping by low permeability materials (i.e., asphalt) is proposed. A low permeability surface will reduce the infiltration of runoff and control erosion. These caps will also limit human exposure to the shallow contaminated soils.

It is proposed that the parking lots and pathways will be graded level with road base, and then paved with asphalt. The road base is anticipated to be approximately 6 to 12 inches thick, and free of contamination.

8.1.3 Soil Remediation – Stabilization by Landscaping (Phytostabilization)

Phytostabilization is the remediation process used to deactivate the transportation/mobility of contaminants in soils by the use of plants. The goal of phytostabilization is to:

- decrease the amount of water infiltrating through the soil (plants uptake and reduce infiltration),
- serve as a barrier between receptors and contaminated soil (sod covers contaminated soil), and

- prevent soil erosion and the distribution of metals to other areas (roots anchor soil).

Areas not covered by buildings or low permeability covers will consist of open development and grazing, play fields, and other landscaping areas. Phytostabilization is proposed for those areas that have been characterized as exhibiting elevated soil lead concentrations. For the open development and grazing, it is anticipated native grasses, sods and various native shrubs and trees will be used, in combination, to cover the areas where elevated metal concentrations exist. Areas to be landscaped, and other areas to be developed, for example the playfields (i.e., running track, soccer field etc), are anticipated to be covered by native grasses, sod or clean, low permeability fill material. Other landscaping features may include gardens and orchards. The soil will have characteristics that will preclude infiltration of irrigation and stormwater into the underlying soil and groundwater/surface water system. It is suggested the imported soil be graded over the area at a consistent thickness of up to 12 inches. Sod will be placed that is compatible with the climate and environmental conditions, and durable and sustainable given the activities that could take place on the fairgrounds (i.e., soccer games, heavy pedestrian traffic, etc).

Selection of the appropriate native grasses, sod, plants, shrubs, and tree types will be based on review of native or landscaping plants that are appropriate for phytostabilization use and that can tolerate the local soil characteristics, and in consultation with the local Natural Resources Conservation Service or Soil Conservation District offices.

8.1.4 Cost Estimate for Remediation Implementation

It is considered that areas that will be covered by buildings or by low permeability covers constructed as part of the fairgrounds will require pre-construction remediation of the soil in order to prepare for building and low permeability cover construction. Costs associated with pre-construction remediation are discussed below. For the areas requiring phytostabilization, approximately 16 acres, comparative project costs are presented below as well as estimated costs for the Property.

Examples of costs from similar projects from Bunker Hill and a former BP Amoco facility are summarized below to provide an estimate of range of potential costs for phytostabilization technologies:

- At the Bunker Hill Superfund site in the State of Idaho, phytoremediation and phytostabilization applications were implemented to remediate and stabilize mining-related soil contamination. This is comparable to the environmental situation that currently exists at the Property associated with this VCUP. For conceptual level purposes, the estimated cost of \$3,000 per acre for phytostabilization for Bunker Hill will be used for cost estimating purposes (Argonne, 2002). Based on the estimated area that will involve phytostabilization at the site (16 acres), the estimated cost for implementation is approximately \$48,000.
- At a former BP Amoco facility in the State of Texas, phytostabilization was implemented to stabilize heavy metals such as lead, cadmium, and copper. The costs to implement phytostabilization were approximately \$18,000 per acre (Tsao, 1998). This system included irrigation systems and research costs (i.e., greenhouse experiments). Based on these costs, the estimated cost for implementation of phytostabilization at the Property associated with this VCUP would be approximately \$288,000. Since research activities are not proposed for

phytostabilization of the Property, it is likely that the cost of phytostabilization will be much less than the per acre costs for the BP Amoco facility.

A conceptual analysis was performed to estimate costs associated with this VCUP. Table 8-2 summarizes the estimated components of each remediation objective, unit costs, and cost per acre basis.

**Table 8-2
Estimated Unit Costs for Remediation Objectives**

Remediation Objective	Component(s)	Component Quantity	Component Costs	Estimated Costs per Acre
Capped by Buildings	Scraping and Moving Native Soil	<ul style="list-style-type: none"> 12,907 cubic yards 	<ul style="list-style-type: none"> Labor + Equipment = \$3.08/cubic yard Mobilization = \$1000 	\$5,094/acre
Capped by Low Permeable Surfaces	Subbase Compaction	<ul style="list-style-type: none"> 40,900 square yards 	<ul style="list-style-type: none"> Compaction = \$0.80/square yard 	\$96,980/acre
	Base Course	<ul style="list-style-type: none"> 40,900 square yards 13,600 cubic yards 	<ul style="list-style-type: none"> Material + Labor = \$7.80/square yard Hauling = \$9.90/cubic yard 	
	Asphalt	<ul style="list-style-type: none"> 40,900 square yards 368,080 square feet 	<ul style="list-style-type: none"> Material + Hauling = \$2.96/square yard Paving = \$0.59/square foot 	
Phytostabilization Landscaping	Topsoil	<ul style="list-style-type: none"> 25,700 cubic yards 	<ul style="list-style-type: none"> Materials + Hauling = \$21.56/cubic yard 	\$51,400/acre
	Sod	<ul style="list-style-type: none"> 560,000 square feet 	<ul style="list-style-type: none"> Materials + Labor = \$0.315/square feet 	
	Tress/Shrubs	<ul style="list-style-type: none"> 200 trees 300 shrubs 300 cubic yards of Prep 	<ul style="list-style-type: none"> Tree = \$260/tree Shrub = \$50/shrub Hauling = 10 percent of total material costs Plant Bed Prep = \$57/cubic yard 	

An actual cost estimate is difficult to estimate on a conceptual level, particularly as the final design details for the fairgrounds construction are not yet defined. Detailed costs estimates would be generated during preparation of the work plan.

8.2 EROSION AND SEDIMENT CONTROL DURING VCUP CONSTRUCTION

To reduce impacts from stormwater runoff and potential flood water from Willow Creek from flowing onto the property, erosion controls will be implemented.

The unavoidable disturbance of soil during construction activities and remediation will temporarily increase the soil erosion potential and potential for human exposure. Therefore, temporary erosion control measures are needed during and following construction until the disturbed areas have been revegetated. Temporary erosion controls consisting of silt fences and rolled erosion control products will be used, as needed, to control erosion at disturbed areas. A

silt fence will be installed and maintained along the site boundaries during construction to limit and control sediment movement.

The VCUP contractor will follow applicable erosion control measures, and install the measures in accordance with manufacturer's specifications, unless otherwise indicated. The VCUP contractor will comply with National Pollutant Discharge Elimination System (NPDES) and other permit requirements, including requirements to inspect the Property after storm events. If damage should occur to the erosion protection measures, the VCUP contractor shall make repairs.

The VCUP contractor will employ reasonable efforts to anticipate and control erosion until permanent control measures have been established. The VCUP contractor will perform routine maintenance and repairs when:

- The sediment retention capacity has been reduced by more than half.
- The erosion and/or sediment control facilities have been torn, ripped, collapse, undermined, flanked, "blown out" or otherwise damaged or compromised.

8.3 INSTITUTIONAL CONTROLS

Institutional controls are designed to reduce the potential for exposure to soils containing metals concentrations greater than the recommended SRO. Institutional controls will be developed to restrict the disturbance to and provide for the maintenance of soil, and assure that future development is protective of the remedial action. Recommended institutional controls include the following:

- Restrictions on soil disturbances.
- Periodic inspection and maintenance of the covered and stabilized areas.
- Periodic inspection of stormwater collection controls across the Property.
- Requirement that the future land use be consistent with the zoning and the level of cleanup conducted under this VCUP.
- Restrictions on groundwater use and septic system development.

9.1 REMEDIATION SAMPLING PROGRAM

It is anticipated that the majority of the area for the Property requiring remediation may be considered as capped by:

- Buildings and construction, or
- Low permeability surfaces (for example parking lots with asphalt cover)

For these capped areas, it is not considered that any monitoring is applicable or required. Therefore, following construction, no further monitoring actions are proposed.

Monitoring will be conducted for the following two aspects of the remediation:

1. The current development Schemes show that the approach requires developed landscaping for certain locations, for example laying of sod for playing fields, planting of trees and shrubs, and grassy areas. The design is currently in the conceptual stage, and detailing of the actual areas has not been finalized at this stage. For these areas there will be an addition of approximately 12 inches of clean soil and topsoil that will form a clean cap over the currently exposed surfaces.
2. For the remaining areas, a phytostabilization approach is proposed, with the selection of native grasses and shrubs to be planted. Approximately 12 inches of clean soil and topsoil will be used to add to the current exposed surfaces. Organic amendments will also be mixed into the upper 6 inches of soil.

For these two aspects, at the time of completion of the landscaping baseline soil core samples will be collected from three locations for each aspect for depths from 0 to 12 inches (equal to the thickness of the topsoil cover) and 12 to 18 inches. These samples will be analyzed using acid base accounting (ABA) and synthetic precipitation leaching procedures (SPLP) to assess the potential for acid leaching and leaching of the metals in the in-situ surface soils and the clean soils brought onto the site. Samples will be analyzed for lead and arsenic. Soil core samples will be collected annually from approximately the same locations for two years following the completion of the landscaping, with the purpose of evaluating the effectiveness of the phytostabilization. If the results indicate that there is deterioration in the acid generating potential of the soils, or an elevation of the SPLP metals concentrations, the MCFA will conduct a study and initiate actions to improve the effectiveness of the landscaping and phytostabilization. At this time, performance standards are not available for inclusion in this VCUP. Performance standards will be developed following the implementation of the proposed remedial actions, and results from baseline acid and metal leaching analyses. The performance standards will be submitted for approval to the appropriate agencies.

In addition, the effectiveness of the phytostabilization and landscaping will be monitored for at least two years following completion of the work to assess the overall health of the grasses, plants, trees, and shrubs. Large species (trees and shrubs) that die will be replaced. At a minimum, there will be replanting of areas of stressed grasses or sod that exceed 15% of the overall coverage.

An estimate of the monitoring program analytical costs are shown on Table 9-1 below.

**Table 9-1
Estimate of Analytical Monitoring Costs**

	Analytical Method	Analytes	Analytical Cost	Baseline		Year 1		Year 2		Total	Total Costs ²
				0-6 inches	6-12 inches	0-6 inches	6-12 inches	0-6 inches	6-12 inches		
Acid Base Accounting	Modified Sodek	<ul style="list-style-type: none"> • Total Sulfur • Sulfate sulfur • Pyritic sulfur • Non-extractable sulfur • Acid Neutral Potential 	\$75	3	3	3	3	3	3	18	\$1,350
Synthetic Precipitation Leaving Procedure	EPA Method 1312 EPA Method 6010 ¹	Lead Arsenic	\$115	3	3	3	3	3	3	18	\$2,070

¹SW 846 Test Methods for Evaluating Solid Waste

²Based on a current analytical laboratory 2003 Schedule of Changes

The proposed schedule for remediation of the Property will be developed following approval of this VCUP application. The WCRC and MCFA will jointly develop the schedule and will present the schedule in the remediation work plan. In accordance with the VCRA, the remediation work will be completed within a two-year period following approval of the application.

The opinions presented in this VCUP application were developed from reviewing available site information supplied by and discussions with the WCRC and discussions with representatives from the MCFA. Site conditions may vary at locations and times other than those for which analytical results are available, and practicality prohibits investigating the entire site. If additional information concerning site environmental conditions becomes available or if environmental conditions change or are altered, the conclusions and recommendations related to the VCUP presented in this document must be reviewed and evaluated to determine if the changes or alterations affect the conclusions presented in this application.

Argonne National Laboratory. No Date. Technology Fact Sheet.

Colorado Department of Public Health and Environment (CDPHE). 1997. Proposed Soils Remediation Objectives Policy. Hazardous Materials and Waste Management Division.

CDPHE. 2002. Targeted Brownfields Assessment – Analytical Results Report, Creede Airport Corner, Creede, Colorado. Hazardous Materials and Waste Management Division.

David Tsao, Ph.D. 1998. Unnamed Technical Report.

EnviroGroup Limited (EnviroGroup). 2000. Analytical Results for Samples Collected at Creede Airport Corner.

EnviroGroup. 2002. VCUP Application for Creede Corner Site.

Willow Creek Reclamation Committee (WCRC). 2001. Airport Corner Land Characterization, Creede, Colorado.

Appendix A
VCRA Checklist

VOLUNTARY CLEAN-UP AND REDEVELOPMENT ACT CHECKLIST AND INFORMATION COMPARISON TABLE

This table provides a checklist of information that may be included in a Voluntary Clean-up Program application. Although not all information requirements apply to all sites, the applicant should review this list carefully and include in the application any information that is relevant to the property in question. The table should be submitted in the application, with the page numbers in the application where this information can be found inserted into the last column. This is not an application requirement, but it does greatly assist the reviewer.

This table may also be used to compare the information normally contained in Phase I and Phase II Environmental Audits, with the requirements of the Voluntary Clean-up Program application. Since these audits are commonly performed, the table will assist owners in determining any additional information that may be needed, if you have already performed a Phase I or Phase II audit.

DIRECTIONS FOR COMPARISON TABLE INTERPRETATION

The table that follows is organized like the one below.

P I	P II	VC	I. General Information	Page
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The first three columns provide the comparison between the information requirements of Phase I (P I) and Phase II (P II) Environmental Audits and the Voluntary Clean-up Program application (VC). In each column you will either see a blank space, a zero (0), a plus sign (+) or a minus sign (-). These can be interpreted as follows:

- + means requirements are more detailed than other documents
- means requirements are less detailed than other documents
- 0 means requirements are similar to other documents
- a blank means that the requirement does not exist for that document

So, for example, if you saw a (+) in the VC column, it means that there are additional information requirements for the Voluntary Clean-up Program application in comparison to the audit reports for that item. If there was a (0) in the VC column, then the information contained in the Phase I or Phase II audit is adequate for the Voluntary Clean-up Program application.

The fourth column provides the checklist of information items required in the Voluntary Clean-up Program application.

The fifth column provides a place for you to insert the page number from the Voluntary Clean-up Program application that pertains to this informational item. If the applicant fills this portion out and returns the table with the application, it greatly assists the reviewer in finding information within the application.

VOLUNTARY CLEAN-UP, ASTM PHASE I, ASTM PHASE II COMPARISON

P I	P II	VC	I. GENERAL INFORMATION	Page
0	0	0	Name and address of owner	2-1
0	0	0	Contact person and phone number	2-1
0	0	0	Location of property	2-2
-	+	+	Type and source of contamination	2-1
		+	Voluntary Clean-up (VC) or No Action Determination (NAD)	2-1
0		0	Current Land Use	2-1
		+	Proposed Land Use. Proposed future land use is not covered in a Phase I or II assessment. A voluntary clean-up approval is contingent upon this item.	2-2

P I	P II	VC	II. PROGRAM INCLUSION	Page
-		+	Is the applicant the owner of the property for the submitted VC or NAD? In a Phase I assessment, the owner is not always the party preparing the assessment. The Voluntary Clean-up Program requires owner/designated representative to complete the submittal.	3-1
-		+	Is the property submitted for the VC or NAD the subject of corrective action under orders or agreements issued pursuant to provisions of Part 3 of Article 15 of this Title or the federal RCRA 1976 as amended? Although Phase I assessments review state records for RCRA corrective actions, the Voluntary Clean-up Program requires details of a corrective action for an eligibility determination.	3-1
-		+	Is the property submitted for the VC or NAD subject to an order issued by or an agreement with the Water Quality Control Division pursuant to Part 6 of Article 8 of this Title? Although Phase I assessments review state records, detail is not discussed. If Water Quality has issued a permit, the applicant is ineligible.	3-1
-		+	Is the property submitted for the VC or NAD a facility that has or should have a permit or interim status pursuant to Part 3 of Article 15 of this Title for treatment, storage or disposal of hazardous waste? Although Phase I assessments review state records, detail is not discussed. For the Voluntary Clean-up Program, details of permits or interim status are necessary for an eligibility determination. Based on the site specifics of the permitted facility, the applicant may qualify for the program.	3-1
-		+	Is the property submitted for the VC or NAD subject to the provisions of Part 5 of Article 20 of Title 8 (Underground Storage Tanks) CRS or of Article 18 of this Title (RCRA)? Although Phase I assessments review state records, detail is not discussed. For the Voluntary Clean-up Program details of Underground Storage Tank or RCRA requirements are necessary to make an evaluation. In some cases (e.g., tanks were removed prior to 12/22/88), the applicant may be eligible for the program.	3-1
-		+	Is the property submitted for the VC or NAD listed or proposed for listing on the National Priorities List of Superfund sites established under the federal act (CERCLA)? Although Phase I assessments review state records, detail is not discussed. For the Voluntary Clean-up Program, details of CERCLA action are necessary to make an evaluation. In some cases, the applicant may not be eligible for the program.	3-1

P I	P II	VC	III ENVIRONMENTAL ASSESSMENT	Page
0	0	0	Qualified environmental professionals must submit environmental assessments. The applicant must submit documentation, in the form of a statement of qualifications or resume.	4-1
0	0	0	The applicant should provide the address and legal description of the site and a map of appropriate scale identifying the location and size of the property.	4-1
0		0	The applicant should describe the operational history of the property in detail, including the most current use of the property.	4-1
0		0	A description of all business/activities that occupy or occupied the site as far back as record/knowledge allows.	4-1
-		+	A brief description of all operations that may have resulted in the release of hazardous substances or petroleum products at the site, both past and present, including the dates activities occurred at the property and dates during which the contaminants were released into the environment. Although Phase I & II assessments may reveal the release of hazardous substances or petroleum products, the exact dates and quantities may not be discussed. For the Voluntary Clean-up Program, the dates of activities, releases, etc., are necessary for an evaluation of eligibility.	4-1 thru 4-2
-		+	A list of all site-specific notifications made as a result of any management activities of hazardous substances conducted at the site, including any and all Environmental Protection Agency ID numbers obtained for management of hazardous substances at the site from either the state or the Environmental Protection Agency. The Phase I assessment will reveal whether a facility has an Environmental Protection Agency ID number, but will not list the notifications made as a result of management activities of hazardous substances. This information is necessary for a Voluntary Clean-up Program evaluation.	4-2
0		0	A list of all notifications to county emergency response personnel for the storage of reportable quantities of hazardous substances required under Emergency Planning and Community Right-to-Know statutes.	4-2
0		0	A list of all notifications made to state and/or federal agencies, such as reporting of spills and/or accidental releases, including notifications to the State Oil Inspection Section (OIS) required under 8-20-506 and 507 and 25-18-104 CRS 1989 as amended and 6 CCR 1007-5 subpart 280.50 Part 3 of the OIS regulations, etc.	4-2
-	-	+	A list of all known hazardous substances used at the site with volume estimates and discussion of relative toxicities. A Phase I & II assessment does not require such detail, however, the hazardous substances used, volumes and toxicities are important for a VC in the overall evaluation of risk and sampling efforts.	4-2
-		+	A list of all wastes generated by current activities conducted at the site and manifests for shipment of hazardous wastes off site. A Phase I & II assessment does not require such detail, however, the manifest information is important for a VC evaluation, as in the above item.	4-2
		+	A list of all permits obtained from state or federal agencies required as a result of activities conducted at the site. A listing of all permits is beyond a Phase I or II assessment. These are important for the Voluntary Clean-up Program so the Department can evaluate what potential sources may be at the site.	4-2
0		0	A brief description of the current land uses, zoning and zoning restrictions of all areas contiguous to the site.	4-2

P I	P II	VC	III. ENVIRONMENTAL ASSESSMENT	Page
			The applicant shall describe the physical characteristics of the site, including a map to scale, and an accompanying narrative showing and describing the following, utilizing historic knowledge as well as current data:	4-2
0	0	0	• Topography	4-2
0	-	0	• All surface water bodies and waste water discharge points	4-2
0	-	0	• Ground water monitoring and supply wells	4-3
0	-	0	• Facility process units and loading docks	4-3
0		0	• Chemical and/or fuel transfer and pumping stations	4-3
0		0	• Railroad tracks and rail car loading areas	4-3
0		0	• Spill collection sumps and/or drainage collection areas	4-3
0		0	• Wastewater treatment units	4-3
0		0	• Surface and storm water runoff retention ponds and discharge points	4-3
0		0	• Building drainage or wastewater discharge points	4-3
0		0	• All above or below ground storage tanks	4-3
0		0	• Underground or above ground piping	4-3
0		0	• Air emission control scrubber units	4-3
0		0	• Water cooling systems or refrigeration units	4-3
0		0	• Sewer lines	4-3
0		0	• French drain system	4-3
0		0	• Water recovery sumps and building foundations	4-3
0		0	• Surface impoundments	4-3
0		0	• Waste storage and/or disposal areas/pits, landfills	4-3
0		0	• Chemical or product storage areas	4-3
0		0	• Leach fields	4-3
0		0	• Dry wells or waste disposal sumps	4-3
			If ground water contamination exists or the release has the potential to impact ground water, the applicant should provide the following information for areas within a one-half mile radius of the site:	4-3
	0	0	• The state engineers office listing of all wells within one-half mile radius of the site, together with a map to scale showing the locations of these wells.	N/A
	0	0	• Documentation of due diligence in verifying the presence or absence of unregistered wells supplying ground water for domestic use, when the potential for such wells is deemed likely as in older residential neighborhoods, or in rural areas.	N/A
	0	0	• A statement about each well within the half-mile radius of the site, stating whether the well is used as a water supply well or ground water monitoring well.	N/A
	0	0	• Lithologic logs for all on-site wells; copies of field log notes may be appropriate.	N/A
	0	0	• Well construction diagrams for all on-site wells showing screened interval, casing type and construction details including gravel pack, interval, bentonite seal thickness and cemented interval.	N/A

PI	PII	VC	III. ENVIRONMENTAL ASSESSMENT	Page
	0	0	<ul style="list-style-type: none"> Description of the current and proposed use of on-site ground water in sufficient detail to evaluate human health and environmental risk pathways. In addition, the applicant will provide a discussion of any state and/or local laws that restrict the use of onsite ground water. 	N/A
			The applicant should provide information concerning the nature and extent of any contamination and releases of hazardous substances or petroleum products that have occurred at the site, including but not limited to:	6-1
	-	+	<ul style="list-style-type: none"> Identification of the chemical nature and extent, both onsite and offsite, of contamination that has been released into soil, ground water or surface water at the property, and/or releases of substances from each of the source areas identified, including estimated volumes and concentrations of substances discharged at each area, discharge point, or leakage point as per Section 25.16.308(2)(b). Although Phase II assessments identify the nature of contamination, the extent is not always fully defined. For Voluntary Clean-up Program purposes, the source, nature, extent and estimated volumes of the release are important in the overall evaluation of risk and eligibility. 	6-1
	0	0	<ul style="list-style-type: none"> A map to scale showing the depth to ground water across the site, direction and rate of ground water movement across the site using a minimum of three measuring points. 	N/A
	0	0	<ul style="list-style-type: none"> A discussion of all hydraulic tests performed at the site to characterize the hydrogeologic properties of any aquifers onsite and in the area. 	N/A
	0	0	<ul style="list-style-type: none"> All reports and/or correspondence, which detail site soil, ground water and/or surface water conditions at the site, including analytical laboratory reports for all samples and analyses. 	5-1 thru 5-8
	0	0	<ul style="list-style-type: none"> A discussion of how all environmental samples were collected, including rationale involved in sampling locations, parameters and methodology, a description of sampling locations, sampling methodology and analytical methodology and information on well construction details and lithologic logs. All sample analyses performed and presented as part of the environmental assessment should be appropriate and sufficient to fully characterize all constituents of all contamination that may have impacted soil, air, surface water and/or ground water on the property. The applicant should use Environmental Protection Agency approved analytical methods when characterizing the soil, air, surface water and/or ground water. 	5-1 thru 5-8

PI	PII	VC	IV. APPLICABLE STANDARDS/RISK DETERMINATION	Page
	-	+	The applicant should provide a description of any applicable standards/guidance (federal, state, or other) establishing acceptable concentrations of constituents in soils, surface water, or ground water, for the proposed land use. Although a Phase II assessment evaluates applicable regulations for the current land use, it does not cover the proposed land use that may be different (e.g., the current land use is industrial and the proposed land use is residential, which likely has more conservative levels for contaminant concentrations).	7-1

P I	P II	VC	IV. APPLICABLE STANDARDS/RISK DETERMINATION	Page
	-	+	The applicant should provide a description of the human and environmental exposure to contamination at the site based on the property's current use and any future use proposed by the property owner, including:	5-1 thru 5-8
	0	0	<ul style="list-style-type: none"> A table or list for site contaminants indicating which media are contaminated and the estimated vertical and areal extent of contamination in each medium. 	5-1 thru 5-8
	-	+	<ul style="list-style-type: none"> A table or list of site contaminants, indicating the maximum concentrations of each contaminant detected onsite in the area where contaminant was discharged to the environment, and/or where the worst effects of the discharge are believed to exist. A Phase II assessment will evaluate the extent of site contaminants, not the maximum point or worst effects. The Voluntary Clean-up Program requests this item so that an understanding of the source and nature of the contaminants can be made as it relates to risk. 	5-1 thru 5-8
	-	+	<ul style="list-style-type: none"> A table or list for site contaminants indicating whether the contaminant has a promulgated state standard, the promulgated standard and the medium the standard applies to. A Phase II assessment will not necessarily compare the site contaminants with state standards. This is important to evaluate whether the remedy will meet risk-based clean-up objectives. 	5-1 thru 5-8
	-	+	<ul style="list-style-type: none"> A description and list of potential human and/or environmental exposure pathways pertinent to the present use of the property. A risk determination is not usually completed as part of a Phase II assessment; the VC will use risk as part of the overall evaluation. 	7-2
		+	<ul style="list-style-type: none"> A description and list of potential human and/or environmental exposure pathways pertinent to the future use of the property. (A risk determination is not usually completed as part of a Phase II assessment; the Voluntary Clean-up Program will use risk as noted above. Phase II assessments also do not evaluate future use of the property.) 	7-2
	-	+	<ul style="list-style-type: none"> A list and map defining all source areas, areas of contamination or contaminant discharge areas. Phase II assessments do not always show source areas. The Voluntary Clean-up Program requires that these areas be defined to indicate the proximity of contaminant with respect to receptors and sampling efforts. 	5-1 thru 5-8
	-	+	<ul style="list-style-type: none"> A discussion of contaminant mobilities, including estimates of contaminants to be transported by wind, volatilization, or dissolution in water. For those contaminants that are determined to be mobile and have the potential to migrate and contaminate the underlying ground water resources, the applicant should also evaluate the leach ability/mobility of the contaminants. This evaluation should consider, but not be limited to the following: leachability/mobility of the contamination, health-based ground water standards for the contamination; geological characteristics of the vadose zone that would enhance or restrict contaminant migration to ground water, including but not limited to grain size, fractures and carbon content; and depth to ground water. This evaluation, and any supporting documentation, should be included in the plan submitted. A Phase II assessment usually does not include a risk determination. However, the Voluntary Clean-up Program will evaluate the risk involved with the proposed clean-up in order to evaluate the application. 	4-3

P I	P II	VC	IV. APPLICABLE STANDARDS/RISK DETERMINATION	Page
		+	The applicant should then provide, using the information contained in the application, a risk-based analysis of all exposure pathways, which details how the proposed remediation will obtain acceptable risk levels. A Phase II assessment usually does not include a risk analysis, however, the Voluntary Clean-up Program requires this analysis to show that the remediation propose will attain an acceptable risk or break pathways.	7-1
		+	The Voluntary Clean-up Program includes remediation whereas a Phase I or II assessment does not. Usually remediation is considered a Phase III assessment. The following are the requirements for the clean-up proposal.	8-1
		+	<ul style="list-style-type: none"> A detailed description of the remediation alternative, or alternatives selected, which will be used to remove or stabilize contamination released into the environment or threatened to be released into the environment 	8-1
		+	<ul style="list-style-type: none"> A map identifying areas to be remediated, the area where the remediation system will be located if it differs from the contaminated areas, the locations of confirmation samples, the locations of monitoring wells, areas where contaminated media will temporarily be stores/staged and areas where contamination will not be remediated. 	8-2 thru 8-3
		+	<ul style="list-style-type: none"> Remediation system design diagrams showing how the system will be constructed in the field. 	N/A
		+	<ul style="list-style-type: none"> A remediation system operation and maintenance plan that describes, at a minimum, how the system will be operated to ensure that it functions as designed without interruptions and a sampling program that will be used to monitor its effectiveness in achieving the desired goal. 	9-1
		+	<ul style="list-style-type: none"> The plan should describe the sampling program that will be used to verify that treatment of the contaminated media has resulted in attainment of the proposed clean-up goals. 	9-1
		+	<ul style="list-style-type: none"> The plan should include a schedule of implementation 	10-1
		+	The clean-up completion report is necessary to demonstrate that the remediation was completed according to the application. Again, since remediation is involved, the report is beyond the scope of a Phase I or II assessment. The following items should be included in the completion report.	N/A
		+	<ul style="list-style-type: none"> A final list of all site contaminants, along with the remaining concentrations, and any deviations from the original plan. 	N/A
		+	<ul style="list-style-type: none"> A final list defining which media are contaminated and the estimated vertical and areal extent of contamination to each medium. 	N/A
		+	<ul style="list-style-type: none"> A final list and map defining all source areas, areas of contamination or contaminant discharge areas. 	N/A
			Soil Contamination: Remediation by Excavation Only:	N/A
		+	<ul style="list-style-type: none"> One confirmation sample per 500 ft² as measured at the base on the excavation OR two confirmatory samples, whichever method results in the collection of the most samples. 	N/A

P I	P II	VC	IV. APPLICABLE STANDARDS/RISK DETERMINATION	Page
		+	<ul style="list-style-type: none"> One composite sample from each wall of the excavation. In excavations of an irregular shape, one composite sample for every 100 lineal feet of wall. For excavations greater than 5000 ft², preparation of a grid for randomization of sampling. 	N/A
		+	<ul style="list-style-type: none"> Explanation of the sampling method in the narrative as well as any modifications to 1 and 2 above used to better characterize the remedial efforts. 	N/A
		+	<ul style="list-style-type: none"> If contamination is to be left in place, an additional sample should be collected from the area of the worst contamination, as verified or with a field-sampling device. 	N/A
		+	<ul style="list-style-type: none"> Depth of samples collected 	N/A
		+	<ul style="list-style-type: none"> Provision of waste disposal manifests 	N/A
			In-Situ Soil Remediation	B-1
		+	<ul style="list-style-type: none"> Completion of a minimum of two soil borings, with at least one completed in the area identified in the site assessment as the area of highest contamination. For larger areas of contamination, one boring per 10,000 ft² of plume area. 	N/A
		+	<ul style="list-style-type: none"> Completion of the borings should employ a field-screening device and borings should be logged. 	N/A
		+	<ul style="list-style-type: none"> Soil sample submitted for analysis from each boring would be the sample with the highest field screening or one located at the ground water interface for each boring. 	N/A
		+	Ground Water Remediation	N/A
		+	<ul style="list-style-type: none"> Field testing should include aquifer and contaminant characteristics such as gradient, partition coefficients, original contaminant levels, etc. 	N/A
		+	<ul style="list-style-type: none"> At each regular monitoring event, a map showing ground water flow direction, depth to ground water and sampling locations 	N/A
		+	<ul style="list-style-type: none"> Tabular presentation of data collected 	N/A
		+	Summary of Voluntary Clean-up Program participation	
		+	Summary of field activities, remedial activities, any deviations from original plans	N/A
		+	Pertinent figures and drawings of remedial system	N/A
		+	Conclusions made after remedial activities are completed	N/A