VOLUNTARY CLEANUP PLAN APPLICATION

FOR THE

VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO

June 2010

Prepared For:

City of Boulder
1720 13th Street
Boulder, Colorado 80306

Prepared By:

Casey Resources Inc.
4890 Kipling Street
Wheat Ridge, Colorado 80033
(303) 940-7800

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY 1

1.0 INTRODUCTION 1
- 1.1 PURPOSE 1
- 1.2 ORGANIZATION OF THE VOLUNTARY CLEANUP PLAN APPLICATION 1

2.0 VOLUNTARY CLEANUP PROGRAM (FORMS) 2
- 2.1 GENERAL AND PROJECT INFORMATION 2
- 2.2 PROGRAM INCLUSION ASSESSMENT 5

3.0 PROPERTY HISTORY 7
- 3.1 HISTORIC LAND USE 7
- 3.2 REGULATORY HISTORY - RADIOACTIVE MATERIALS LICENSE AND MAINTENANCE OF THE TAILINGS PONDS 8
- 3.3 EVALUATION OF POTENTIAL ENVIRONMENTAL CONDITIONS BASED ON PREVIOUS LAND USES 12

4.0 SUMMARY OF AVAILABLE REPORTS, CORRESPONDENCE, AND ENVIRONMENTAL INVESTIGATIONS 13
- 4.1 CDPHE/BHD INSPECTIONS AND SAMPLING 13
  - 4.1.1 Milling Operations 13
  - 4.1.2 Water Supply Well Sampling 14
  - 4.1.3 Air Pollution Control 14
- 4.2 ADDITIONAL CORRESPONDENCE/REPORTS 15
  - 4.2.1 Strategic Metals International, Inc. 15
  - 4.2.2 Radium-226 Impacted Construction Debris 15
  - 4.2.3 CDPHE/Hendricks Milling Company 16
- 4.3 PRAIRIE DOG MANAGEMENT 17
- 4.4 ENVIRONMENTAL INVESTIGATIONS/REPORTS 18

TABLE OF CONTENTS (Continued)

Page

4.4.1 Environmental Protection Agency Investigations – 1982 to 1985..... 18
4.4.2 Tusco Incorporated..... 19
4.4.3 Valmont Butte Corporation Environmental Report for the State of Colorado Radiation Control Division, Allied Chemical Mill, 3000 N. 63rd Street, Boulder, CO 80301. Prepared by Valmont Butte Corporation, October 10, 1996..... 20
4.4.4 Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division, Uranium and Special Projects Unit, Technical Evaluation of Surface Gamma Radiation Survey, Valmont Butte Corporation Site, Boulder, Colorado. Prepared by CDPHE, July 27, 1999..... 20
4.4.5 Decision Analysis: Assurance of Equivalent Protection to Public Health and Environment in the Absence of a Colorado Radioactive Materials License, for Valmont Butte Site, Valmont Butte Corporation, Boulder, Colorado. Prepared by CDPHE, October 6, 1999..... 22
4.4.6 Phase I Environmental Site Assessment, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado. Prepared by Alisto Engineering Group for the City of Boulder, September 8, 2000 23
4.4.7 Asbestos Abatement, Valmont Butte Site Mill Building, 3000 North 63rd Street, Boulder, Colorado. Prepared by Acclaim Environmental Services, Inc. for the City of Boulder, August 7, 2001..... 23
4.4.8 Limited Intrusive Environmental Site Assessment, City of Boulder, Colorado, Proposed Biosolids Dewatering and Composting Project, Boulder, Colorado. Prepared by Terracon for the City of Boulder, July 11, 2003, Revised September 30, 2003 24
4.4.9 Analytical Results Report for Site Reassessment, Valmont Butte/Allied Piles, Boulder, County, Colorado. Prepared by URS Operating Services, Inc. for EPA, January 6, 2005 25
4.4.10 Final Report Valmont Butte Hazardous and Industrial Waste Removal and Disposal. Prepared by S. M. Stoller Corporation for the City of Boulder, February 2, 2007..... 30

TABLE OF CONTENTS (Continued)

Page

4.4.11 Identification and Confirmation of Soils Requiring Long Term Management, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado. Prepared by Casey Resources, Inc. for the City of Boulder, November 24, 2009. 31

5.0 EXISTING CONDITIONS 33
5.1 SITE DESCRIPTION 33
5.1.1 Mill Site 33
5.1.2 Primary and Secondary Tailings Ponds 33
5.1.3 Outlying Vacant Areas 34
5.2 TOPOGRAPHY 34
5.3 LAND USE 34
5.4 GEOLOGY 35
5.5 HYDROLOGY 35
5.6 HYDROGEOLOGY 36
5.6.1 Groundwater Occurrence 36
5.6.2 Groundwater Quality 37
5.6.3 Groundwater Discussion 38
5.7 METALS AND RADIATION DISTRIBUTION AND CHARACTERIZATION IN SOIL 39
5.7.1 Metals Distribution and Characterization in Soil 39
5.7.2 Radiation Distribution and Characterization in Soil 40
5.7.3 Discussion of Mining Residual Impacts 40
5.8 METALS AND NORM IN BUILDING INTERIORS 42

6.0 RISK EVALUATION 43
6.1 POTENTIAL RECEPTORS 43
6.1.1 Construction Worker 44
6.1.2 Open Use City Worker 44
6.1.3 Tribal Use 45

TABLE OF CONTENTS (Continued)

Page

6.1.4 Mill Site Use 45
6.2 SOIL ACTION LEVELS 45

7.0 VALMONT BUTTE REMEDIATION PLAN 46
7.1 PLANNING AND DESIGN 46
7.2 MATERIALS MANAGEMENT PLAN (MMP) 48
7.2.1 Management of Mining Residuals 48
7.2.2 Grading of Consolidated Mining Residuals 49
7.2.3 Confirmation Sampling and Analysis 49
7.2.4 Cap Construction 49
7.2.5 Construction Controls 50
7.2.6 Prairie Dog Management During Construction 51
7.2.7 Storm Water Management Plan Implementation 51
7.2.8 Site Drainage Structures 51
7.2.9 Existing Structure Decommissioning/Demolition 52
7.2.10 Closure of Existing Well Adjacent to Valmont 52
7.3 CONSTRUCTION WORKER SAFETY 52
7.4 DECONTAMINATION 53
7.5 REMEDIATION ACTIVITY REPORTING 53
7.6 POST REMEDIATION OPERATIONS & MAINTENANCE PLAN 53

8.0 GROUNDWATER MONITORING PLAN 55

9.0 REFERENCES 56

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

Figure 1 Property Location and Vicinity Map
Figure 2 Facility Map
Figure 3 Historic Building Eligibility
Figure 4 Approximate Location of the Housing Authority Radium-226 Disposal Pit
Figure 5 Tailings Material Release North of Primary Dike Dam
Figure 6 Mining Residual Management Areas
Figure 7 Monitoring Well and Borehole Location Map
Figure 8 Geology Map
Figure 9 Drainage Divide 1950
Figure 10 Drainage Divide 1967
Figure 11 Remediation Plan

LIST OF TABLES

Table 1 Historic Drinking Water Sample Results
Table 2 Bedrock Lithology
Table 3 Estimated Volume of Mining Residuals Requiring Long Term Management

LIST OF APPENDICES

Appendix A High-Density Compact Disk – Electronic Copies of Referenced Materials
Appendix B Land Survey Plat
Appendix C Warranty Deed
Appendix D Water Well Survey
Appendix E Confirmation Soil Sampling and Analysis Plan
Appendix F Import Soils Protocol

LIST OF ACRONYMS AND ABBREVIATIONS

Acclaim Acclaim Environmental Services, Inc.
ACM Asbestos Containing Material
Alisto Alisto Engineering Group
Allied Allied Chemical Corporation
AMSL Above Mean Seal Level

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

Applicant	City of Boulder
bgs	Below Ground Surface
BHD	Boulder County Department of Public Health
BMP	Best Management Practice
DVD	High-Density Compact Disk
CDPHE	Colorado Department of Public Health and Environment
City	City of Boulder
CRI	Casey Resources, Inc.
DOW	Division of Wildlife
EDI	Environmental Demolition, Inc.
E&E	Ecology and Environment, Inc.
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
GPS	Global Positioning System
Hendricks	Hendricks Mining and Milling Company
HRS	Hazard Ranking System
MMP	Materials Management Plan
NaI	Sodium Iodide
NFRAP	No Further Remedial Action Planned
NORM	Naturally Occurring Radioactive Material
NPL	National Priority List
mg/Kg	Milligram Per Kilogram
mg/L	Milligrams Per Liter
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyls
ppb	Parts Per Billion
PPE	Personal Protective Equipment
ppm	Parts Per Million
Property	Valmont Butte Property
RCRA	Resource Conservation and Recovery Act
SI	Site Investigation
SPLP	Synthetic Precipitation Leaching Procedure
Stoller	S.M. Stoller Corporation
Strategic Metals	Strategic Metals International, Inc.

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

SWMP	Storm Water Management Plan
Tusco	Tusco Incorporated
URS	URS Operating Services, Inc.
µg/L	Micrograms Per Liter
µR/hr	Micro-roentgens Per Hour
VCRA	Voluntary Cleanup and Redevelopment Act
VCUP	Voluntary Cleanup Plan
VOCs	Volatile Organic Compounds
WALSH	Walsh Environmental Scientists and Engineers, LLC
XRF	X-Ray Florescence

EXECUTIVE SUMMARY

The City of Boulder, Colorado (the "City" or "Applicant") submits this Voluntary Cleanup Plan ("VCUP") Application to request inclusion in the Colorado Department of Public Health and Environment's ("CDPHE's") Voluntary Cleanup Program for real property known as the Valmont Butte Property (referred hereafter as the "Property") located at 3000 North 63rd Street, Boulder, Colorado (Figure 1). The Property is located in Boulder County approximately four miles east of the City's central business district and more specifically 1.5 miles east of the Foothills Parkway and Pearl Street intersection. The Property in bounded on the north by Valmont Road and on the west by North 63rd Street.

Upon approval of this VCUP Application by the CDPHE, the City plans to implement this plan and complete the CDPHE reporting requirements. The City's potential future uses of the Property include outdoor equipment storage, energy generation, a historical mining museum or commercial use located in the former mill area (Open Use), and open space for preservation of certain natural features and vistas (non-accessible Open Space). The north portion of the Property is quite steep and generally is dedicated non-accessible Open Space to protect certain natural features along the ridgeline of Valmont Butte.

Property Description

The Property occupies approximately 101 acres with the majority lying on the south side of the Valmont Butte, a volcanic outcrop that trends east to west along the south side of Valmont Road, and north of the Xcel Energy Valmont Power Plant reservoirs (Leggett-Owen and Valmont Reservoirs).

The Property consists of three areas as shown on Figure 2:

- Mill Site – The Mill Site includes the former mill complex, including the mill building used to crush and concentrate gold and fluorspar ores, a garage, laboratory building, office building, and several miscellaneous buildings. Buildings eligible for the National Register of Historical Places are shown on Figure 3. None of the buildings or structures on the Property are in use. The Mill Site includes the area west of the mill building including the former railroad spur alignment and southwest trending gully. The Mill Site also includes the backfilled area to the east of the buildings. The Mill Site area extends from the western Property boundary to approximately 900 feet east of the mill building and encompasses an area of approximately 18 acres.

- Primary and Secondary Tailings Ponds - The tailings generated from the processing of ores at the mill were deposited in two tailings ponds located in the central part (primary tailings pond) and eastern side (secondary tailings pond) of the Property. The areas of the primary tailings pond and the secondary tailings pond are estimated at 12.5 acres and 4.5 acres, respectively. The primary and secondary tailings ponds are approximately 30 feet lower in elevation than the Mill Site located to the west. Together, the primary and secondary tailings ponds encompass an area of approximately 17 acres (Figure 2).

- Outlying Vacant Areas - The remainder of the Property, approximately 66 acres, is vacant land. This includes the Valmont Butte ridge north to Valmont Road, open land areas east of the primary and secondary tailings ponds extending to the eastern Property boundary, and open land to the south of the primary and secondary tailings ponds. These outlying areas include well established vegetation areas and sensitive cultural areas (possible Native American use and potential early pioneer burial) (Figure 2).

Property History

The Property was historically used by Native American Indians and later, by European settlers. In 1936, St. Joe Mining and Milling Co. acquired the Property and sometime thereafter built a mill on the western portion of the Property. St. Joe Mining and Milling Co. processed gold ore until approximately 1940, when the Property was sold to General Chemical Corporation. In 1947, General Chemical Corporation merged with Allied Chemical Corporation ("Allied"). Allied milled fluorspar ore at the Property from 1941 to 1973, generating approximately 400,000 cubic yards of fluorspar tailings. The fluorspar tailings contain naturally occurring radioactive materials ("NORM") and heavy metals, including lead and arsenic, and were deposited within two tailings impoundments referred to as the primary tailings pond and the secondary tailings pond. In 1971, the Colorado Department of Health (currently the CDPHE) notified Allied that a license was required to possess and use radioactive material at the Property. In 1971, CDPHE issued Radioactive Material License Colo. 117-01 to Allied. In October and December 1971, Allied obtained modifications to its Radioactive Materials License to allow disposal of up to 1,500 cubic yards of radium-226 impacted demolition debris from a Boulder Housing Authority construction project in the City. The materials were disposed in a disposal pit reportedly excavated within Pierre Shale and located west of the primary tailings pond.

In 1976 the Property was purchased by Tusco Incorporated ("Tusco"). In 1977, Hendricks Mining and Milling Company ("Hendricks") leased the Property and converted the mill to process gold ore. Hendricks obtained Radioactive Materials License Colo. 329-01 on April 4, 1977, to address the continuing storage of radioactive material in the tailings ponds. Hendricks operated the mill until 1985, processing 75,000 tons of ore. Waste tailings from the gold ore

processing were deposited on top of the fluorspar tailings in the primary tailings pond. The Hendricks milling operation placed approximately 45,000 cubic yards of gold tailings onto the primary tailings pond. After Hendricks ceased milling operations in 1985, Tusco reportedly placed approximately one to two feet of soil on both the primary and secondary tailings ponds and seeded the area. The cover soil reportedly was obtained from a borrow pit located on the hillside south of the primary tailings pond.

Valmont Butte Corporation purchased the Property from Tusco in July 1994. After Valmont Butte Corporation purchased the Property, it requested that CDPHE determine if a license for continued storage of NORM was necessary. Based on communications with CDPHE, Valmont Butte Corporation prepared an environmental report outlining proposed and completed remedial activities at the Property and submitted a request to terminate the Hendricks Radioactive Materials License. Based on commitments from Valmont Butte Corporation and the establishment of environmental covenants on the Property, CDPHE concluded that the Hendricks license could be terminated.

The City of Boulder purchased the Property in September 2000. The Property was originally acquired for construction of a Fire Training Center and a Biosolids Recycling Center, and for Open Space to protect certain natural features along the ridgeline of the Valmont Butte. Development plans for the Property as a Fire Training Center and a Biosolids Recycling Center are not currently being pursued. As a result, the Property has remained vacant and has not been used by the City since its purchase.

Geology/Hydrology/Hydrogeology

The geology of the Property consists of the Valmont Butte, a volcanic dike located on the north side of the Property and the Upper Transition Member of the Pierre Shale which underlies the Property. In the vicinity of the Property, the Upper Transition Member of the Pierre Shale consists of claystone underlain by shale. The overall length and depth of the volcanic dike is not known. Columnar jointing has been noted in exposed areas of the dike and the Pierre Shale has been metamorphosed in and around the volcanic dike intrusion. The surface geology of the Property includes Slocum alluvium on the west and south portions of the Property, artificial fill, and tailings deposits. The surface deposits are underlain by the Upper Transmission Zone of the Pierre Shale.

There are no surface water ponds or streams located on the Property. There is an intermittent drainage area located on the far northeastern portion of the Property.

Regionally, the Pierre Shale contains only limited groundwater and the quality of the groundwater is poor. Alluvial groundwater systems exist north of Valmont Butte (Boulder Creek alluvial system) and likely within the drainage associated with the Xcel Energy Power Plant lakes (Valmont Reservoir, Leggett-Owen Reservoir, and Hillcrest Lake) located south of the Property.

Groundwater has been identified in the claystone bedrock underlying the Property. The groundwater occurrence, however, was sporadic and discontinuous within the claystone unit, and at an elevation approximately 20 feet or more below the base of the tailings materials. The fine-grained matrix of the bedrock deposits results in groundwater flow characteristics of low permeability and high porosity, which limit groundwater migration. Groundwater samples collected from the existing onsite monitoring wells indicated significant chemical contribution from the marine deposits of the Pierre Shale.

Soil Quality

A number of environmental investigations have been completed at the Property, beginning as early as 1985. The most recent environmental investigation was conducted in the summer of 2009 to assess the soil quality outside the boundaries of the primary and secondary tailings ponds. Based on the Property's historical use and previous investigation results, lead has been selected as the indicator parameter for environmental impact to soil. Approximately 1,000 X-ray fluorescence ("XRF") measurements were taken during the 2009 metals screening program. Approximately 679,600 square feet (15.6 acres) of the Property were identified as containing lead concentrations that exceeded the screening value for lead of 800 milligrams per kilogram ("mg/Kg"). The lead impacted areas also included the majority of identified arsenic concentrations that exceeded the previously established background concentration of 10 mg/Kg.

A radiation survey of the Property's soil was also conducted. Over 115,000 data points were collected during the survey and correlated to specific onsite radiation source measurements. Based on the data averaged over 25 square feet, the highest predicted exposure rate was 41.9 micro-roentgens per hour ("µR/hr"). There were no exposure rates greater than the 68 µR/hr screening criteria established by CDPHE (≤ 48 µR/hr above background).

Remediation Strategy

The remediation strategy at the Property is driven by the need for a properly engineered cap on the tailings and the need to properly manage mining residuals located outside the tailings pond area. In outline, the first remedial component is to excavate the mining residuals in the secondary tailings pond area and consolidate these materials in the primary tailings pond. Then

mining residuals excavated from elsewhere on the Property will be used to regrade the tailings pond area so that precipitation runoff is directed to the south of the primary tailings pond, where it can be collected and routed to a temporary storm water retention area. The primary tailings pond will then be capped with an engineered cap cover that will meet applicable regulatory criteria and withstand the infestation of prairie dogs. This cap will consist of two feet of clean soil overlain by 1.5 feet of rock. The existing covenants boundaries will be modified as needed to accurately cover the capped area. This strategy, coupled with access and use controls, will be protective of human health and the environment for the intended use of the Property.

Excavation could be problematic in certain culturally sensitive areas where capping in place may be necessary. Heavily vegetated areas that contain concentrations of lead that exceed the proposed action level of 800 mg/Kg, such as the north slope of Valmont Butte, will be left undisturbed. The existing vegetative growth in those locations will continue to be a permanent protective cover against erosion.

The remediation strategy must satisfy certain other regulatory requirements and requires certain State and County approvals, including storm water management; drainage, erosion and dust control; grading; and worker protection. Other aspects of the planning and design effort will address decontamination and demolition of certain existing structures, dam safety compliance, prairie dog control, and revegetation plans for areas that are disturbed during remediation.

Selection of Cleanup Action Levels

Soil cleanup levels for the Property will be based on the CDPHE proposed worker (commercial) use soil cleanup value of 800 mg/Kg for total lead. The five elevated radiation areas previously identified by URS (2005) are located in areas that will be remediated for lead impact or will have established access and use controls. In addition, elevated arsenic concentrations are typically co-located with elevated lead concentration areas. In most cases, arsenic concentrations in excess of 50 mg/Kg are co-located with the lead concentrations in excess of the 800 mg/Kg action level and therefore will be managed along with the lead. Arsenic concentrations less than 50 mg/Kg will have limited exposure potential given the proposed access and use controls.

1.0 INTRODUCTION

The City of Boulder, Colorado (the "City" or "Applicant") submits this Voluntary Cleanup Plan ("VCUP") Application for the Valmont Butte Property (hereafter referred to as the "Property"). The Property is located east of the City of Boulder, in Boulder County, as shown on Figure 1.

This VCUP Application has been developed in accordance with the Voluntary Cleanup Program administered by the Colorado Department of Public Health and Environment ("CDPHE") and pursuant to the Voluntary Cleanup and Redevelopment Act ("VCRA").

1.1 PURPOSE

This VCUP Application has been prepared by Casey Resources, Inc. ("CRI"), on behalf of the City, to support the inclusion of the Property in the Voluntary Cleanup Program, given the current environmental condition and current plans for use of the Property.

1.2 ORGANIZATION OF THE VOLUNTARY CLEANUP PLAN APPLICATION

The VCUP Application is organized as follows. Section 2.0 includes VCUP forms titled "General and Project Information" and "Program Inclusion Assessment." Section 3.0 summarizes the historical land use of the Property. Section 4.0 summarizes environmental investigations previously conducted at the Property. Section 5.0 discusses the present environmental condition of the Property and the chemicals of concern. Section 6.0 provides a discussion of the cleanup action levels and actions proposed to limit potential risk to human health and the environment. Section 7.0 discusses remediation plans and engineering controls. Section 8.0 describes groundwater monitoring plans. Section 9.0 provides a listing of the reference documents, files, and other information used to develop this VCUP Application. Copies of the reports and documents cited throughout this VCUP Application are included in the high-density compact disk ("DVD") found in Appendix A.

2.0 VOLUNTARY CLEANUP PROGRAM (FORMS)

As part of the VCUP Application requirements, the following completed forms are included in this section:

- General and Project Information; and
- Program Inclusion Assessment.

2.1 GENERAL AND PROJECT INFORMATION

1. Name and Address of Owner

City of Boulder
P.O. Box 791
Boulder, Colorado 80306-0791

2. Contact Person and Number

Owner:
City of Boulder – Pubic Works
Facilities & Fleet Management
P.O. Box 791
Boulder, Colorado 80306-0791
303-884-4128
Attn: Mr. Joe Castro, P.E.

Technical Consultant:
Casey Resources, Inc.
4890 Kipling Street
Wheat Ridge, CO 80033
303-940-7800
Attn: Mr. Paul Casey, P.E.

3. Property Location

The Property is located in Boulder County approximately 1.5 miles east of the Foothills Parkway and Pearl Street intersection. The Property in bounded on the north by Valmont Road, on the west by North 63rd Street, and on the east and south by land owned by Xcel Energy as part of the Valmont Power Plant (Figure 1). This VCUP Application is for the Property defined above and outlined on Figure 2.

The Property is located in the approximate south half of the southeast quarter of Section 22 and the south half of the southwest quarter of Section 23, Township 1 North, Range 70 West of the Sixth Principal Meridian, Boulder County, Colorado. The legal description is

provided in Appendix B. The Property boundary, as detailed in a Land Survey Plat dated August 10, 2000, is illustrated on Figure 2.

4. Type/Source of Contamination

The contamination present on the Property includes mining residuals that contain naturally occurring radioactive materials ("NORM") and elevated concentrations of certain metals, particularly lead. The term "mining residuals" is used throughout this report to define the materials generated from historic milling operations at the Property (tailings), fluorspar and gold ore waste rock, unprocessed fluorspar and gold ore, and any other related residuals.

These mining residuals result from the refining of fluorspar and gold ores at a mill located on the western portion of the Property. The fine grained mining residuals, consisting primarily of waste tailings from the milling of the ore, were deposited in two tailings ponds located in the central portion and eastern portion of the Property and are referred to as the primary and secondary tailings ponds, respectively. The primary and secondary tailings ponds have constructed dams at the eastern end of each tailings pond. Former erosional channels on the north side of the tailings ponds were also dammed. The primary tailings pond has one north side dam referred to as the primary dike dam. The secondary tailings pond has two north side dams referred to as the east and west secondary dike dams (Figure 2).

In addition, up to 1,500 cubic yards of radium-226 impacted demolition debris from a Boulder Housing Authority construction project in the City was disposed at the Property. A 1976 Boulder County Department of Public Health ("BHD") Special Environmental Health Report indicates the radium-226 impacted demolition debris were disposed in a 90-foot diameter pit located west of the primary tailings pond (BHD, 1976).

5. If Contamination Will Remain on the Property Following Implementation of Your Proposal, Provide GPS Coordinates.

Mining residuals will remain onsite with the majority of these residuals contained within the primary tailings pond. Mining residuals within the secondary tailings pond will be excavated and placed in the primary tailings pond. Mining residuals outside the primary and secondary tailings ponds will either be excavated and consolidated in the primary tailings pond, or in certain limited circumstances capped in place, or such as on the north slope of Valmont Butte, left undisturbed. The primary tailings pond will be capped with an engineered cap described in this VCUP.

At the completion of the remedy construction, mining residual areas will be described and documented on maps to be presented in the Remediation Construction Completion Report prepared on completion of this project. In addition, legal descriptions and associated representative figures will be developed for these mining residual areas by a professional survey company. The legal descriptions and representative figures will be included in the Remediation Construction Completion Report and in an updated environmental covenant for the Property.

6. VCUP or NAD

This is a Voluntary Cleanup Plan Application per C.R.S. §25-16-304.

7. Current Land Use

Currently the Property is not in use. The north portion of the Property is designated non-accessible Open Space to protect certain natural features along the ridgeline of the Butte.

Surrounding land use includes the Valmont community, Keeter Trucking Company, and Pioneer Sand and Gravel Company facilities to the north; Western Disposal refuse transfer station, Western Disposal yard waste collection center, Boulder County Hazardous Waste Collection center, the Stazio sports complex, and concrete recycling mixing batch plant to the west; Valmont Pioneer Cemetery, Xcel Energy Power Plant, Valmont Reservoir, Leggett-Owen Reservoir, and Hillcrest Lake to the south; and Xcel Energy fly ash disposal site to the east.

8. Proposed Future Land Use

The City's potential future uses of the Property include outdoor equipment storage, energy generation, and possibly a historical mining museum or a commercial use located in the former mill area (Open Use) and open space for preservation of certain natural features and vistas (non-accessible Open Space). The north portion of the Property is and will remain non-accessible Open Space to protect certain natural features along the ridgeline of Valmont Butte.

2.2 PROGRAM INCLUSION ASSESSMENT

This section discusses the eligibility of the Property under the VCRA for inclusion in the Voluntary Cleanup Program. The questions answered below follow the list on pages 1 and 2 in Appendix 3 of CDPHE's Voluntary Cleanup Roadmap.

1. **Is the Applicant the Owner of the Property for the Submitted VCUP or NAD? If Yes, Verify Ownership.**

   Yes. The City acquired the Property via Warranty Deed on September 5, 2000 from Valmont Butte Corporation and Lincoln Trust Company. The Warranty Deed, Statement of Settlement for Buyer, and Owner's Policy of Title Insurance are provided in Appendix C as proof of ownership.

2. **Is the Property Submitted for the VCUP or NAD Listed or Proposed for Listing on the National Priorities List of Superfund Sites Established Under the Federal Act (CERCLA)?**

   No.

3. **Is the Property the Subject of Corrective Action Under Orders or Agreements Issued Pursuant to the Provisions of Part 3 of Article 15 of this Title or the Federal "Resource Conservation and Recovery Act of 1976", as Amended? If Yes, Please List Order Number.**

   No. An "*Agreement and Declaration of Covenants*" established certain restrictions and controls for the Property in 1999 under the CDPHE's Radiation Control Division for NORM contained in the primary and secondary tailings ponds (CDPHE, 1999c).

4. **Is the Property 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 this Title? If Yes, Please List Order or Permit Number.**

   No.

5. **Is the Property a Facility Which Has or Should Have a Permit or Interim Status Pursuant to Part 3 of Article 15 of this Title (RCRA Subtitle C) for Treatment, Storage, or Disposal for Hazardous Waste? If Yes, Please List Permit Number.**

   No.

6. **Is the Property Subject to Provisions of Part 5 of Article 20 of Title 8 (Underground Storage Tank - State Oil Inspector), C.R.S., or of Article 18 of this Title (RCRA Subtitle I)?**

   No.

3.0 PROPERTY HISTORY

There is considerable information available on the Property's history. Useful information sources include the City's website and United States Environmental Protection Agency ("EPA") and CDPHE files.

3.1 HISTORIC LAND USE

The Property was originally inhabited and used by Native American Indians and later, by European settlers. In 1936, St. Joe Mining and Milling Co. acquired the Property and sometime thereafter built a mill on the western portion of the Property to process gold ore from mining operations in Left Hand Canyon. St. Joe Mining and Milling Co. operated the Valmont Mill until approximately 1940 (City of Boulder, 2009). General Chemical Corporation purchased the mill and Property in 1941 and in 1947 merged with Allied Chemical Corporation ("Allied"). Allied processed fluorspar ore from the Burlington Mine located in the Jamestown District (Alisto Engineering Group, 2000). Water for the milling operations was obtained from the Jones Donnelly Ditch west of the Property. Water for the buildings was supplied by a water supply well located on the south side of Valmont Road (Figure 2).

Allied operated the mill at the Property from 1941 to 1973 and placed process wastes into tailings ponds located east of the mill. According to the 2005 URS Operating Services, Inc. ("URS") "*Analytical Results Report for Site Reassessment*" prepared for EPA, Allied's operations at the Property resulted in the disposal of approximately 400,000 cubic yards of fluorspar tailings within the tailings ponds. URS (2005) and EPA (1985a) report that a spill occurred in the 1940s where wave action in the vicinity of the primary dike dam released tailings to the north side of Valmont Butte ("1940 spill"). CDPHE and BHD documents indicate that blowing dust from the tailings ponds was a continuing concern during Allied's operations. Allied discontinued its milling operations at the Property in 1973, but continued to own and maintain the Property until December 9, 1976, when the Property was sold to Argentorado Mines, Inc. (City of Boulder, 2009). Argentorado Mines, Inc. was owner of the Property from December 9, 1976 to December 28, 1976 when the Property was sold to Tusco (City of Boulder, 2009).

From approximately 1977 to 1985, Hendricks Mining and Milling Company ("Hendricks") leased the Property from Tusco. Hendricks converted the mill to process gold ore and began processing gold ores from the Caribou and Cross mines located west of Netherland, Colorado (Valmont Butte Corporation, 1996). Hendricks reportedly processed approximately 75,000 tons of gold ore through the mill from 1977 through 1985. Waste tailings from the gold ore processing were deposited on top of the fluorspar tailings in the primary tailings pond (Valmont

Butte Corporation, 1996). URS (2005) estimates that the Hendricks milling operation placed approximately 45,000 cubic yards of gold tailings onto the primary tailings pond.

Both Allied and Hendricks sublet the former garage at the mill area to Mr. Al McGowan who converted the garage into a small gold recovery operation that used physical separation processes without use of chemicals (Alisto Engineering Group, 2000).

Valmont Butte Corporation purchased the Property from Tusco in July 1994 (Valmont Butte Corporation, 1996). During its ownership, Valmont Butte Corporation leased portions of the Property to several small commercial tenants.

The City of Boulder purchased the Property in September 2000. The Property was originally acquired for construction of a Fire Training Center and a Biosolids Recycling Center, and preservation of the Valmont Butte vista as Open Space. When the City purchased the Property, there were five to ten parties leasing portions of the Property. These lessees included a log home builder, carpenter, rock and mineral club, cabinet maker, and various small contractors (City of Boulder, 2009). These leases were terminated by the City shortly after purchase. Development plans for the Property as a Fire Training Center and a Biosolids Recycling Center are not currently being pursued. As a result, the Property has remained vacant and has not been used by the City since its purchase.

3.2 REGULATORY HISTORY - RADIOACTIVE MATERIALS LICENSE AND MAINTENANCE OF THE TAILINGS PONDS

In a letter dated July 12, 1971, the Colorado Department of Health (currently the CDPHE) indicated that the tailings material was sampled on March 31, 1971 from the area near the north dike dam and analyzed for radium-226, natural uranium, and polonium-210. CDPHE indicated that the radiological results for the tailings material sample, coupled with the measurements taken during a July 7, 1971 site inspection, dictated that a license be obtained to possess and use radioactive material at the Property (CDPHE, 1971a).

In response to this notice, Allied prepared and submitted an Application for Radioactive Material License to the CDPHE. In August 1971, the CDPHE approved the Allied application and issued Radioactive Material License Colo. 117-01 with an expiration date of August 31, 1974 (CDPHE, 1971b).

In October and December 1971, Allied obtained modifications to its Radioactive Materials License (CDPHE, 1971c,d). These modifications allowed for the transportation and disposal on the Property of up to 1,500 cubic yards of radium-226 impacted demolition debris from a

Boulder Housing Authority construction project in the City. Additional discussion on this disposal activity is presented in Section 4.2.2.

Allied sought additional modifications to the license as operational and managerial changes occurred at the Property. Allied ceased milling operations in early 1974. In a letter dated August 22, 1975, Allied notified CDPHE that its mining services offices located on the Property would be closed effective the end of the month (Allied Chemical Corporation, 1975). Allied committed to continued weekly inspections and reporting and staffing of the facility until the Property was sold to Argentorado in 1976. Though Allied and CDPHE corresponded in 1974 and 1975 about stabilization of the tailings ponds, Allied did not ultimately undertake any stabilization of the ponds and did not terminate its license with CDPHE.

After the Property was sold to Tusco in late December 1976, Hendricks submitted an Application for Radioactive Materials License for the Property in which Hendricks requested a new license as the "*Valmont Mill will be in operation by April 1, 1977, and additional material conveyed to the tailings pond will not be radioactive. The primary material will be silica sand.*" (Hendricks, 1977). Hendricks obtained Radioactive Materials License Colo. 329-01 on April 4, 1977, to address the continuing storage of radioactive material in the tailings ponds. The permit expiration date was April 30, 1980 (CDPHE, 1977).

In a letter dated September 5, 1984, Hendricks requested that CDPHE provide evidence that the Radioactive Materials License Colo. 329-01 remained in force as the Hendricks records indicated that the license was not renewed in 1980 (Hendricks, 1984b). CDPHE replied in a letter dated July 19, 1984 that the license "*remains in force until terminated by the Department*." (CDPHE, 1984e). The license, however, was not renewed by Hendricks or Tusco (CDPHE, 1999b).

In a letter dated February 18, 1988, CDPHE informed Hendricks that any property containing radium bearing tailings must be licensed for storage by the Radiation Control Division and that CDPHE was concerned regarding the closure of the Property (CDPHE, 1988).

According to CDPHE (1999b), after milling operations ceased, Tusco placed approximately one to two feet of fill material on both the primary and secondary tailings ponds and seeded the area. The fill material apparently was obtained from a borrow pit located on the hillside south of the primary tailings pond. There are no records available confirming the quality, placement, or final depth of the fill material across the tailings ponds.

After Valmont Butte Corporation purchased the Property in 1994, Valmont Butte Corporation inquired of CDPHE if a license for continued storage of NORM was necessary. By letter dated

June 1, 1995, CDPHE indicated that the Property did not require further licensure (CDPHE, 1995).

Based on communications with CDPHE, Valmont Butte Corporation prepared an environmental report outlining proposed and completed remedial activities at the Property and submitted a request to terminate the Hendricks Radioactive Materials License (CDPHE, 1999b). In this report, Valmont Butte Corporation proposed to remediate the Property through capping the primary and secondary tailings ponds with clean fill and to attach covenant restrictions to the Property to protect the remediation cap. Valmont Butte Corporation notes that it had placed 10,000 tons of fill material on the center of the tailings pile and completed removal of certain residual radioactive fluorspar tailings from areas outside the tailings ponds and placed those mining residuals into the primary tailings pond (Valmont Butte Corporation, 1996 and CDPHE, 1999a). This report does not provide any backup material to confirm that this work was done or done properly.

Nonetheless, in response to Valmont Butte Corporation's request, CDPHE (1999b) evaluated the Property and prepared the *Decision Analysis: Assurance of Equivalent Protection to Public Health and Environment in the Absence of a Colorado Radioactive Materials License, for Valmont Butte Site, Valmont Butte Corporation, Boulder, Colorado* ("Decision Analysis"). In this document, CDPHE concluded the following:

- *"There are no off-site impacts to ground water or surface water from the cell containing radioactive soil and tailings".*

- *"That maintenance of surface cover and contouring at the site will effectively mitigate any potential for adverse water impacts".*

- *"All identified areas of contamination had either been remediated or were approved for no further action".*

- *"RESRAD computer modeling of radiation dose to an on-site resident resulting from residual radioactivity at the Valmont Butte site, including both residential and industrial/commercial scenarios in the tailings pond and windblown contaminated areas, demonstrated that a resident would receive less than the NRC basic dose limit for restricted use when institutional controls are in place, of 25 mrem/yr".*

- *"That the Agreement and Declaration of Covenants, as an institutional control, together with the remedial actions performed at the site, are protective of public health and environment"*.

- *"With these covenants and restrictions in place, the Department finds that equal protection of public health and safety or property is assured in the absence of a radioactive material license"*.

- *"Therefore, the Colorado Radioactive Materials License, No. 329-01, issued to Hendricks Mining Company for storage only of fluorspar mill tailings and contaminated soil, should be terminated"*.

Based on this determination, CDPHE and Valmont Butte Corporation and Lincoln Trust Company (the then current land owners) entered into the "*Agreement and Declaration of Covenants*" dated October 12, 1999 to ensure protection of public health and the environment through maintenance of the tailings ponds and inert cap cover and through other covenant restrictions (CDPHE, 1999c). With the covenants in place, the Radioactive Materials License No. 329-01 for the Property was terminated (CDPHE, 1999b).

The EPA conducted a "Site Reassessment" of the Property in 2004 which was completed by URS under contract to EPA (See Section 4.4.9). The *Agreements and Declaration of Covenants* were amended in August 2004 to allow for EPA and its contractor to collect environmental samples from the tailings pond area.

On completion of the Site Reassessment, the EPA made certain recommendations for the Property, focused on NORM constituents (EPA, 2005b). However, the Federal radiation standards cited by EPA are applicable to "uranium and thorium mill tailings associated with uranium processing sites" and are not applicable to the fluorspar tailings found at the Property.

The City completed a number of activities at the Property to address the EPA recommendations. These included:

- The City contracted in 2005 to develop a scope of work for the removal of materials (drums, tanks, transformers, used oil, and other wastes) from the Property and to monitor the waste removal completed by an environmental waste management contractor. In 2006, S.M. Stoller Corporation ("Stoller") completed the removal action and documented the removal action in the report titled, "*Final Report, Valmont Butte Hazardous and Industrial Waste Removal and Disposal*", dated February 2, 2007 (S.M. Stoller, 2007; See Section 4.4.10 for further discussion).

- Terracon also developed initial plans for remediation of certain mining residuals outside the tailings ponds and developed preliminary plans for capping the tailings ponds.

- In 2006, the City contracted with Roe Ecological Services, LLC to assist in the development of a management plan for prairie dogs at Valmont Butte.

- The City contracted in 2007 to conduct a Wildlife Assessment to document onsite wildlife species and to assess the prairie dog population (City of Boulder, 2009). In 2007 and 2008, the City installed prairie dog mitigation barriers around the primary and secondary tailings ponds. Walsh Environmental Scientists and Engineers, LLC ("WALSH") completed field screening and soil sampling, worker air monitoring, and health and safety oversight, during the installation of the prairie dog mitigation barriers (City of Boulder, 2009).

- After unsuccessful attempts to find a relocation site for the Valmont Butte prairie dogs and the Colorado Division of Wildlife's (DOW's) prohibition on relocating the prairie dogs from the Property, the City contracted with Nature's Balance in 2008 and 2009 to euthanize prairie dogs from the tailings pond areas (City of Boulder, 2009).

- The City continues to monitor and manage the prairie dogs at the Property. Section 4.3 describes in further detail the activities to date to mitigate and control prairie dogs.

3.3 EVALUATION OF POTENTIAL ENVIRONMENTAL CONDITIONS BASED ON PREVIOUS LAND USES

The Valmont Butte mill facility was used to crush and process fluorspar and gold ores and to store waste tailings. As a result, the primary and secondary tailings ponds contain NORM, as well as heavy metal concentrations that exceed CDPHE proposed soil cleanup values for commercial land use. In addition, surface soils in various areas of the Property are impacted with these same constituents, likely through accidental spills, storage of materials, and wind and water erosion of material and waste piles. Other potential issues, such as transformers and miscellaneous drums and above ground storage tanks, have been addressed by the City through removal and appropriate disposal (see Section 4.4.10).

4.0 SUMMARY OF AVAILABLE REPORTS, CORRESPONDENCE, AND ENVIRONMENTAL INVESTIGATIONS

The milling operations at the Property were monitored by the CDPHE and the BHD, starting in the 1960s. Other inspections and investigations were conducted by the Colorado Geological Survey, EPA, Terracon, and Stoller, among others. Pertinent information from the previous investigations and inspections of the Property are discussed in the following sections. Copies of the reports and documents cited are included in the DVD found in Appendix A.

4.1 CDPHE/BHD INSPECTIONS AND SAMPLING

The available records indicate that monitoring activities and inspections at the Property were conducted by both CDPHE and BHD beginning in the mid- to late 1960s. BHD conducted the majority of the facility inspections, with occasional assistance from CDPHE. Inspections included surveys of plant/facility operations, testing of water supplies and tailings pond water, air emissions, and radiation surveys. In addition, BHD completed inspections of the plant/facility operations after receipt of complaints from nearby residents of blowing dust and unauthorized discharges. CDPHE and BHD also sampled residential water wells north of the Property.

Significant findings associated with review of the BHD/CDPHE inspection reports are presented in the following sections.

4.1.1 Milling Operations

Milling operations were typically documented on Industrial Wastes Inventory forms. Pertinent information from review of the available documents is as follows:

- Industrial Wastes Inventory dated November 22, 1966 (CDPHE, 1966b) – The plant processes 100 tons per day of fluorspar ore and consumes 1,200 pounds of soda ash, 400 pounds of fatty acids, and 350 pounds of sodium silicate per day in the process. Operations run 24 hours a day, seven days a week, 12 months a year. Irrigation ditch water provides the process water for milling at 97,000 gallons per day. The waste discharge of 97,000 gallons per day is directed to two settling ponds. This waste contains 50 to 70 tons per day of solids (tailings) that are retained in the settling ponds.

- Special Environmental Health Report dated March 8, 1973 (BHD, 1973a) – Boiler blowdown (cooling water) is discharged to an irrigation ditch that drains west from the Mill Site and eventually discharges to Boulder Creek.

- BHD letter dated September 12, 1973 (BHD, 1973b) – Discusses Allied's request for additional pumping facilities to serve waste disposal operations at the Property. The letter indicates the current system consists of three settling basins with a return pump for recycling water back to the mill. The volume of water to be used daily was estimated at 200,000 gallons.

4.1.2 Water Supply Well Sampling

CDPHE conducted sampling of nearby residential water supply wells periodically from 1967 through 1984. CDPHE results for residential water well samples were reviewed for sampling events conducted in 1967, 1969, 1970, 1971, 1979, 1981, and 1984. Reported concentrations for radium-226, gross alpha, gross beta, uranium, and fluoride are summarized on Table 1.

Nearby residential wells were also sampled by URS (2005) for inorganic, organic, and radioactive constituents. None of the wells sampled contained constituent concentrations exceeding current drinking water standards, with the exception of the dissolved arsenic concentration in the sample collected from the Melton/Mitchell well (VB-DW-06) located at 6029 Indian School Road. URS (2005) concluded that the arsenic concentration identified in the Melton/Mitchell well was attributable to an upgradient source in the alluvial aquifer.

4.1.3 Air Pollution Control

The Clean Air Act of 1963 and Air Quality Act of 1967 provided for federal regulation of air pollution emissions. The Colorado Radioactive Materials License obtained by Allied in 1971 also required Allied to control wind-blown dust from the tailings ponds.

A BHD memorandum dated October 24, 1972 provides a listing of documents/correspondence between BHD and Allied regarding air pollution control (BHD, 1972). According to this memorandum, BHD initially contacted Allied regarding air pollution concerns in November 1966. In 1967, BHD requested Allied to control emissions from the facility. In September 1967, Allied committed to control stack emissions and fugitive dust from the tailings ponds. This memorandum continues with a listing of inspection dates and dates of control equipment installation. BHD received complaints about blowing dust from the tailings ponds in at least 1969, 1970, and 1972. The memorandum indicates that Allied raised the water level in the tailings ponds to cover the dry tailings and seeded open areas.

Based on CDPHE and BHD documents, blowing dust was a continuing problem during the Tusco and Hendricks operations.

4.2 ADDITIONAL CORRESPONDENCE/REPORTS

Several other documents were located regarding the operations at the Property. Those containing potentially pertinent information are addressed below.

4.2.1 Strategic Metals International, Inc.

In a February 11, 1983 letter to BHD, Strategic Metals International, Inc. ("Strategic Metals") requested permission to dispose its waste tailings material within the tailings ponds located at the Property (Strategic Metals International, Inc., 1983). These tailings were waste products from the Strategic Metals precious metal recovery facility located at Rocky Flats. The letter notes that within two months of approval approximately 25 tons per week would be disposed at the Property. In a February 15, 1983 letter, CDPHE approved the disposal of the Strategic Metals tailings at the Property (CDPHE, 1983a). However, an April 19, 1983 letter from the CDPHE indicates that authorization to dispose Strategic Metals tailings material at the Property was withdrawn based on laboratory testing results indicating the cadmium and lead concentrations within the tailings exceeded the EPA toxicity hazardous waste limits (CDPHE, 1983b). Based on the limited correspondence, it is not known if any of the Strategic Metals International, Inc. tailings were disposed at the Property.

4.2.2 Radium-226 Impacted Construction Debris

Allied's Radioactive Materials License 117-01 was amended on October 22, 1971 and December 7, 1971 to allow for disposal of radium impacted soils from a Boulder Housing Authority construction project at the corner of 3rd and Pearl Streets in Boulder (CDPHE, 1971c,d). The radium impacts originated from a former tungsten-radium mill operated at this location in the early 1900s. In the December 6, 1971 letter to Allied from CDPHE approving the modification of the Radioactive Materials License Colo. 117-01, CDPHE noted that approximately 200 truckloads of radium impacted soil would be disposed at the Property and that the average concentration of the impacted soil was 80 pCi/gram (CDPHE, 1971d).

Historical documents indicate the radium impacted soil was deposited in a dedicated pit, now referred to as the disposal pit. The disposal pit reportedly was located west of the primary tailings pond and was 90-feet in diameter (BHD, 1976). The radium impacted soil was covered with at least four feet of soil. According to the *Decision Analysis* (CDPHE, 1999b), as well as the *Agreement and Declaration of Covenants* (CDPHE, 1999c), approximately 1500 cubic yards of soil were deposited in the disposal pit at the Property.

In its *Environmental Report*, Valmont Butte Corporation (1996) reported that *"over 10,000 tons of clean fill"* were placed over the center of the tailings pile and *"also covered the area where the City of Boulder buried the waste from the 3rd and Pearl site with approximately 25 feet of clean fill dirt, by extending the upper level out and over that disposal site."*

Aerial photographs from 1971 and 1972 were reviewed to determine if the disposal pit location could be confirmed. As shown on Figure 4, a disturbed area west of the primary tailings pond may be the disposal area and matches the description provided by BHD (1976). The disturbed area is approximately 99 feet long north to south and approximately 54 feet wide.

This area shown on Figure 4 conflicts with the disposal pit area identified by URS (2005). URS identified the disposal pit area based on the presence of construction debris at the ground surface. The area identified by URS is in the vicinity of the Mill Site backfill area and construction debris is evident throughout this area. Soil samples collected by URS in this area did not exhibit radiation readings consistent with a disposal site at this location.

4.2.3 CDPHE/Hendricks Milling Company

There are a number of letters between CDPHE and Hendricks. The majority of the correspondence involves an offer from Hendricks to donate 500,000 cubic yards of onsite soil to the State Highway Department in return for the State Highway Department excavating that material to generate a new tailings pond and to cover the existing pond (Hendricks, 1984a). This proposal, however, was never acted upon. Pertinent information from these letters is provided below.

In the same February 15, 1983 letter that CDPHE approved the disposal of the Strategic Metals tailings at the Property (CDPHE, 1983a), CDPHE also noted the following: *"You are cautioned to ensure that your tailings pile material adjacent to your North fence line along Valmont Road does not exceed the fence line. All of this material between your North dike and North fence line should be recovered to the tailings pile no later than the time that you add on to the present tailings dikes."* A 1966 aerial photograph clearly shows the tailings material south of Valmont Road (Figure 5).

CDPHE requested EPA to assist in evaluating the long term storage of NORM at the Property in response to Hendricks proposal to cap the tailings pond (CDPHE, 1984a). In this letter CDPHE notes that a visit on June 4, 1984 by the Colorado Geological Survey did not identify environmental, structural, or geological concerns associated with the long term storage. The letter also notes that approximately 300,000 cubic yards of fluorspar tailings with radium concentrations ranging from 50 pico-curries per gram (pCi/g) to 200 pCi/g were stored in the tailings ponds.

A CDPHE Inter-Office Communication dated June 14, 1984 notes that construction on Valmont Road had removed as much as three feet of impacted material back to the tree line (CDPHE, 1984b). This material, totaling approximately 300 tons (10 dump and two tandem loads), was placed on the operating area of the primary tailings pond.

4.3 PRAIRIE DOG MANAGEMENT

The cover material on the tailings ponds consists of varying thicknesses of soil of unknown quality placed on the tailings and was not designed or engineered to address precipitation accumulation (ponding) and runoff, erosion, or burrowing animals. The thickness of the existing cover material varies from zero to 2.0 feet on the primary tailings pond (URS, 2005). In recent years, prairie dog encroachment has further compromised the existing cover material.

The City has undertaken a number of interim activities in response to the prairie dog incursion. These activities are summarized below.

- In 2005, the City notified CDPHE, through its consultant Terracon, that the integrity of the cover material was being compromised by the prairie dog infestation. The City contracted with Roe Ecological Services to assess the wildlife management issues at the Property. Roe Ecological Services completed an inventory of terrestrial burrowing animals residing on the tailings ponds caps, collected tissue samples from 30 prairie dogs (completed under a Special Permit for Lethal Control of Prairie Dogs), and conducted sampling and analysis of soils from prairie dog mounds (Roe Ecological Services, 2006). Results from the testing indicated that the low levels of arsenic, lead, and uranium present in prairie dog tissue samples would not be toxic to predator species if prairie dogs were relocated offsite.

- In early 2007, the City re-inventoried the prairie dog population to address concerns regarding a potential plague outbreak and to solicit bids for removal.

- In the fall of 2007, the City requested approval from the DOW to relocate prairie dogs from the Property and also put out a public notice requesting volunteers to accept prairie dogs onto their property. DOW denied the request to relocate prairie dogs both onsite and offsite from the tailings pond areas (City of Boulder, 2009).

- In the fourth quarter of 2007, the City constructed a prairie dog mitigation barrier that was placed approximately 30 feet outside the area of the tailings ponds as defined in the *Agreement and Declaration of Covenants*. However, during construction of the barrier

fence, elevated radiological readings were encountered in some of the postholes excavated for the barrier fence.

- As a result of these elevated radiological readings, the City installed a second prairie dog barrier fence around what is now termed the larger "management area."

- The City euthanized approximately 250 prairie dogs within the tailings ponds and management area between October 2008 and January 2009 and another 35 prairie dogs in November 2009, under Special Permits for Lethal Control of Prairie Dogs, (City of Boulder, 2009).

- The City conducts regular monitoring for prairie dog activity on the tailings ponds.

4.4 ENVIRONMENTAL INVESTIGATIONS/REPORTS

Several environmental investigations/reports have been conducted at the Property beginning in 1982. A summary of the environmental investigations in chronological order is provided in the following sections.

4.4.1 Environmental Protection Agency Investigations – 1982 to 1985

In 1982, EPA conducted a Preliminary Assessment ("PA"), Site Investigation ("SI"), and a Hazardous Ranking System ("HRS") evaluation on the Property. The HRS evaluation scored 27.8 out of the 28.5 score required to propose the Property to the National Priority List ("NPL"). The Property received a No Further Remedial Action Planned ("NFRAP") status.

In 1984, Ecology and Environment, Inc. ("E&E") on behalf of EPA completed a site reconnaissance of the Property. The site reconnaissance memorandum, dated December 31, 1984, documented that Hendricks was milling gold and silver bearing quartz ore from the Caribou Mine. The extraction process used pine oil and xanthates to separate out the precious metals (E&E, 1984).

In 1985, E&E completed a limited groundwater investigation at the Property. The work plan developed for this program indicated that geophysical surveys would be conducted east of the primary tailings dam to assist in selecting drilling locations and that four monitoring wells would be installed (one upgradient and three downgradient monitoring wells). The investigation included geophysical investigations east of the primary and secondary tailings ponds, drilling of two boreholes, and sampling and analysis of composite grab samples of clay/claystone from the boreholes. The two borings were drilled up to 45 feet below ground surface ('bgs") and

completed in the Pierre Shale bedrock (See Figure 7 for borehole locations). Groundwater was not encountered in either location and the boreholes were backfilled and abandoned. Because groundwater had not been encountered in either of the first two borings, a determination was made not to drill the remaining planned borings.

A memorandum dated March 8, 1985 (EPA, 1985c), provided results for the composite soil samples collected by E&E. The memorandum indicated the uranium and gross alpha results were indicative of background concentrations.

4.4.2 Tusco Incorporated

In 1980, M.J. Bright Minerals Development, Inc. completed a radiation survey of the tailings ponds at the Property for Tusco and provided the results on a hand drawn map along with a two page summary letter. The author noted that the older fluorspar tailings exhibited yellow-orange coloration and higher radiation levels than the more recent gray tailings. The author also suggested that the radiation levels at the surface of the tailings pond could be reduced by placing approximately one foot of the newer tailings over the older tailings or by keeping the older tailings covered with water (M.J. Bright Minerals Development, Inc., 1980).

EPA (1985b) provided Mr. LaFollette of Tusco information regarding the health effects from low-level radioactivity as found at the Property. EPA noted the fluorspar tailings contain approximately 20 pCi/g of radium-226 versus uranium tailings that contain from 500 to 1500 pCi/g radium-226.

In 1986, Tusco provided a letter to the BHD outlining a remediation plan to reduce fugitive particulate emissions from the tailings ponds (Tusco, 1986). This plan included treating a portion of the tailings with limestone, then covering the tailings pond with topsoil obtained from the hillside south of the primary tailings pond. The plan also called for seeding the capped tailings pond and borrow source area with a native grass seed mixture. BHD responded in a March 28, 1986 letter indicating its approval of the capping plan (BHD, 1986).

No records documenting the Tusco pond cover program have been located. However, according to CDPHE (1999b), Tusco placed approximately one to two feet of fill material on both the primary and secondary tailings ponds and seeded the area after milling operations ceased at the Property. CDPHE (1999b) indicated the fill material apparently was obtained from a borrow pit located on the hillside south of the primary tailings pond.

4.4.3 Valmont Butte Corporation Environmental Report for the State of Colorado Radiation Control Division, Allied Chemical Mill, 3000 N. 63rd Street, Boulder, CO 80301. Prepared by Valmont Butte Corporation, October 10, 1996.

The purpose of this environmental report as stated by Valmont Butte Corporation was to "*provide current information about the former Allied Chemical Fluoride Mill and the associated mill tailings area. The following information should allow the Colorado Department of Public Health and Environment Radiation Control Division to release the radioactive materials license that was issued by the State to Allied Chemical*".

This report outlined proposed and completed remedial activities at the Property and presented various discussions on the Property history, facility layout, land use, surface water, groundwater, geology, fauna-flora, among others.

In this report, Valmont Butte Corporation proposed to remediate the Property through capping the primary and secondary tailings ponds with clean fill and to attach covenant restrictions to the Property to protect the ponds and the cover material. Valmont Butte Corporation states that it had placed 10,000 tons of fill material on the center of the tailings pile and completed removal of certain radioactive residual fluorspar tailings from areas outside the tailings ponds and placed those mining residuals into the primary tailings pond. Valmont Butte Corporation states that its plan is to sell or develop the Property and that any new structures at the Property would include radon gas mitigation systems. No documentation supporting these statements has been located.

4.4.4 Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division, Uranium and Special Projects Unit, Technical Evaluation of Surface Gamma Radiation Survey, Valmont Butte Corporation Site, Boulder, Colorado. Prepared by CDPHE, July 27, 1999.

CDPHE personnel completed gamma radiation inspections at the Property in August and November 1998 and May and June 1999. The stated purpose of the inspections was to assess the effectiveness of remedial activities being conducted at the Property. The remediation activities consisted of relocating areas of radioactive tailings identified outside the tailings ponds to the primary tailings pond and covering with fill material.

Background radiation was established as 15 to 18 µR/hr at a location approximately one half mile south of the Property. For the radiation inspections, CDPHE established a cleanup value of 30 µR/hr "*on contact with the surface soil and including contributions from background radiation*". During each inspection of the Property, CDPHE personnel identified areas outside the tailings pond areas that exhibited radiation levels greater than 30 µR/hr. These areas were then excavated and move to the tailing pond by the current owner (listed as Tim Smith).

This report specifically addressed the inspections conducted in May and June 1999. There were 14 areas identified by CDPHE with radiation levels greater than 30 µR/hr. One of these "areas" was a 55-gallon drum located within the wood shop on the Property. The following areas were described and plotted on a map.

- Remaining Areas – 1) The hillside south of the primary and secondary tailings ponds. The estimated area of impact was 350,000 square feet. No remediation was completed in this area. 2) Hillside north of the primary and secondary tailings pond with an estimated area of 450,000 square feet. Most of this area was not remediated. A small area accessible to equipment was covered with 18 inches of fill material. 3) The area north of the primary dike dam. No remediation was completed due to dense vegetation. 4) The area north of the wood shop along the former slurry line alignment. No remediation was completed due to steep slopes. CDPHE attributed this distribution to "windblown impact".

- Secondary Tailings Pond – Two areas were identified as exhibiting radiation greater than 30 µR/hr. Both areas were covered with 18 inches of fill material.

- Primary Tailings Pond – Five areas on the tailings pond exhibited radiation levels greater than 30 µR/hr. These areas were covered with two feet of fill material.

- Wood Shop – Three areas along the back side of the Wood Shop were excavated and placed in the tailings pond. The excavation was backfilled with fill material. Two areas in front of the shop near a tree stump were not remediated. The drum containing elevated radiation readings was removed from the Property on June 7, 1999.

- Mill Site – Three areas on the west side of the mill and one area on the east side of the mill building exhibited radiation levels greater than 30 µR/hr. These areas were not remediated.

- Ore Storage Area – This area also exhibited radiation levels greater than 30 µR/hr. This area was not remediated.

The report also identified areas of concern including 1) the long term maintenance requirements for prairie dog control, 2) erosion of windblown impacted areas, 3) proper disposal of mining residuals when onsite building demolition occurs, 4) erosion of tailings dams, and 5) consideration of a long term surveillance plan to be administered by CDPHE.

4.4.5 Decision Analysis: Assurance of Equivalent Protection to Public Health and Environment in the Absence of a Colorado Radioactive Materials License, for Valmont Butte Site, Valmont Butte Corporation, Boulder, Colorado. Prepared by CDPHE, October 6, 1999.

In its 1996 Environmental Report, Valmont Butte Corporation requested the CDPHE to "*release the storage license that was originally issued to Allied Chemical Corporation*". In response to this request and in light of Valmont Butte Corporation's activities onsite, CDPHE developed the *Decision Analysis*. This report provided a description of the Property history, current status, and future plans; and provided evaluation and analysis of the available environmental data for the Property, including RESAD modeling of residual radioactive material. Based on this analysis CDPHE concluded the following:

- *"There are no off-site impacts to ground water or surface water from the cell containing radioactive soil and tailings".*

- *"That maintenance of surface cover and contouring at the site will effectively mitigate any potential for adverse water impacts".*

- *"All identified areas of contamination had either been remediated or were approved for no further action".*

- *"RESRAD computer modeling of radiation dose to an on-site resident resulting from residual radioactivity at the Valmont Butte site, including both residential and industrial/commercial scenarios in the tailings pond and windblown contaminated areas, demonstrated that a resident would receive less than the NRC basic dose limit for restricted use when institutional controls are in place, of 25 mrem/yr".*

- *"That the Agreement and Declaration of Covenants, as an institutional control, together with the remedial actions performed at the site, are protective of public health and environment".*

- *"With these covenants and restrictions in place, the Department finds that equal protection of public health and safety or property is assured in the absence of a radioactive material license".*

- *"Therefore, the Colorado Radioactive Materials License, No. 329-01, issued to Hendricks Mining Company for storage only of fluorspar mill tailings and contaminated soil, should be terminated".*

4.4.6 Phase I Environmental Site Assessment, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado. Prepared by Alisto Engineering Group for the City of Boulder, September 8, 2000

On August 10, 2000 Alisto Engineering Group ("Alisto") performed a Phase I Environmental Site Assessment ("ESA") of the Valmont Butte Property for the City. Alisto did not perform or recommend any further soil or groundwater investigations during this assessment, referring to E&E's 1985 investigation for groundwater and soil conditions.

Alisto did recommend that the City have Mr. Hendricks remove drums and equipment from the Property and that the City remove unused chemicals and wastes from the Property and complete an asbestos remediation. Alisto also recommended testing of an onsite transformer for the presence of polychlorinated biphenyls ("PCBs") and if PCBs were present that the oil be replaced with non-PCB oil.

Alisto concluded, "*Since process wastes or tailings are reportedly contained in the pond, are covered with clean fill, and groundwater has not been encountered in the area, it is apparent that there is no exposure pathway to impact public health or the environment. On that basis, and since the State has placed drilling restrictions on the tailings pond area, no additional investigation is recommended at the time*".

4.4.7 Asbestos Abatement, Valmont Butte Site Mill Building, 3000 North 63rd Street, Boulder, Colorado. Prepared by Acclaim Environmental Services, Inc. for the City of Boulder, August 7, 2001

Acclaim Environmental Services, Inc. ("Acclaim") reported that an asbestos inspection of all the occupied and unoccupied buildings at the Property was performed by Family Environmental on August 29, 2000 and that Family Environmental identified both friable and non-friable asbestos containing material ("ACM") within the mill building.

An abatement of the mill building ACM was conducted by Environmental Demolition, Inc. ("EDI"), beginning on or about June 22, 2001, and completed on August 1, 2001. All known ACM was removed with the exception of window putty (glazing compound) used in glazing windows, boiler rope gasket on doors and portals, interior boiler insulating materials (assumed), and fabric squeegee material on mixing equipment in the hopper room (assumed).

Following the bulk removal of ACM from surfaces, the surfaces were scraped and cleaned with scour pads and wet wiping in an effort to remove residual asbestos. As a precaution, a lockdown encapsulation was applied to these surfaces to control and minimize any remaining residual asbestos fibers from becoming airborne. Approximately 35 cubic yards of asbestos waste was

shipped to and disposed by Waste Management of Colorado at a Colorado approved landfill (Denver Arapahoe Disposal Site).

4.4.8 Limited Intrusive Environmental Site Assessment, City of Boulder, Colorado, Proposed Biosolids Dewatering and Composting Project, Boulder, Colorado. Prepared by Terracon for the City of Boulder, July 11, 2003, Revised September 30, 2003

In the spring of 2003, Terracon performed a limited intrusive ESA on the eastern portion of the Property in anticipation of the City utilizing this portion of the Property as a biosolids dewatering and composting facility. This ESA included subsurface exploration and a limited geophysical survey of the portion of the Property east of the primary tailings pond and outside the covenant area. Six soil borings were drilled and four of the soil borings were converted to groundwater monitoring wells. Lithology was reported for each boring and soil and groundwater samples were submitted for analysis. Soils were also screened during drilling activities for gamma radiation.

Terracon reported the typical lithology to include lean clay with varying amounts of sand and gravel from ground surface to approximately 19 feet bgs with claystone and shale bedrock underlying the unconsolidated lean clay. Groundwater was encountered within the claystone bedrock at monitoring well MW-1 at a depth of approximately 30 feet bgs and within shallow colluvial deposits at approximately 12 feet bgs at monitoring well MW-4.

Soil samples were collected from the interval immediately above the groundwater table or at the bottom of the boring if groundwater was not encountered. Soil sample results indicated that concentrations for all eight Resource Conservation and Recovery Act ("RCRA") metals were less than published residential land use values or were less than the laboratory detection limits, with the exception of arsenic. Arsenic concentrations ranged up to 4 milligrams per kilogram ("mg/Kg") but were considered to be within the normally occurring background concentrations for arsenic. Volatile organic compounds ("VOCs") were not detected above the laboratory detection limits in the soil samples.

The soil samples were also analyzed for NORM isotopes. The results indicated that the clay and shale bedrock contained naturally occurring radioactive compounds, including gross gamma radiation, potassium-40, lead-212, and radium-228.

Terracon also completed onsite screening of soil samples for gamma radiation during drilling. The screening indicated gamma radiation ranging from 24 micro-roentgens per hour ("µR/hr") to 28 µR/hr compared to a background concentration of 25 µR/hr.

Analytical results for groundwater samples collected from monitoring wells MW-1 and MW-4 varied significantly with the geology of the boring (claystone bedrock versus colluvial clay with some sands and gravels, respectively). The constituents identified in the groundwater sample from monitoring well MW-1 included total selenium at 0.067 milligrams per liter ("mg/L"), total nitrogen at 37 mg/L, total sulfate at 3,150 mg/L, benzene at 2.9 micrograms per liter ("µg/L"), and toluene at 4.4 µg/L.

Terracon states, "*Shallow groundwater beneath the site in well MW-1 appears to be impacted by selenium, nitrogen (as nitrate + nitrite) and NORM.*" However, the concentrations reported for NORM, selenium, total nitrogen, and total sulfate are representative for groundwater samples collected from shale or claystone deposits. The low detection of benzene and toluene concentrations may also be resultant of naturally occurring petroleum compounds in the claystone/shale.

Analytical results for the groundwater sample from monitoring well MW-4 collected on June 4, 2003 indicated total sulfate at 476 mg/L, chloroform at 10 µg/L, and m+p xylenes at 1.8 µg/L. A second sample was collected in July 2003 and no VOCs were detected.

4.4.9 Analytical Results Report for Site Reassessment, Valmont Butte/Allied Piles, Boulder, County, Colorado. Prepared by URS Operating Services, Inc. for EPA, January 6, 2005

In late 2004, URS performed a "Site Reassessment" of the Property with the stated purpose "*to gather information for the evaluation of the current site conditions with regard to the EPA's Hazard Ranking System (HRS) and removal criteria (Office of the Federal Register 1990).*"

URS completed field sampling activities at the Property and areas west and north of the Property. One of the purposes of the report was for URS to provide a new assessment of any potential offsite impacts from the various contaminants identified at the Property.

The report includes a description of the Property and its history; discussions on the geography, geology, hydrology, and hydrogeology of the Property; evaluation of field samples; and discussions on exposure pathways, data quality assessment, and screening level risk assessment. Pertinent information from the report is summarized below:

- The major sources of impacts identified on the Property by URS were the mining residuals contained in the primary and secondary tailings ponds; the radium-226 disposal

pit area; drums, tanks, and transformers remaining on the Property from previous operations; and five areas of surface soil impact previously identified by CDPHE (1999a).

- The primary tailings were 20 feet to 30 feet in thickness on the edges of the pile and over 40 feet in thickness near the center of the pile.

- The primary tailings pond consists of upper gold tailings and lower fluorspar tailings. The gold tailings were light yellow gray to orange in color and consisted predominantly of silt with some sand. The thickness of the gold tailings ranged from 0.9 feet to 5.5 feet. The underlying fluorspar tailings were between 14 feet and 39 feet in thickness and consisted of interbedded light gray silty sand and dark gray-black clay.

- URS estimated the volume of the fluorspar tailings in the primary tailings pond at 327,000 cubic yards and the volume of gold tailings at 45,000 cubic yards.

- The primary tailings pond has a soil cover that varies in thickness from 10-inches to 24-inches, and averages 17-inches. There were areas in the primary tailings pond where there was no soil cover and areas where prairie dog activity had brought mining residuals to the surface.

- Perched groundwater was encountered in four of the eight borings placed in the primary tailings ponds at depths of 10 feet to 33 feet below the tailings (ground) surface. The shallower depths to perched groundwater occurred near the middle of the primary tailings pond. Perched groundwater was not encountered in the secondary tailings pond. Assuming an elevation of 5,248 feet above mean sea level ("AMSL") for the primary tailings pond ground surface, the perched groundwater occurs at 5,215 feet and 5,238 feet AMSL. This is approximately nine feet to 32 feet above the original floor of the basin which is at an elevation of approximately 5,206 feet AMSL (based on URS boring VB-BP-14).

- One boring was drilled in the primary dike dam. The results obtained from this boring indicated the dam was constructed with processed tailings.

- The mining residuals contained in the secondary tailings pond appear to be fluorspar tailings based on color and are coarser grained than the primary tailings. The estimated volume of the secondary tailings was 70,000 cubic yards.

- The thickness of the soil cover in the secondary tailings pond ranged from 16 inches to 36 inches and averaged 23.5 inches. Prairie dog activity had also compromised the secondary tailings pond cover material.

- Synthetic Precipitation Leaching Procedure ("SPLP") analysis completed on primary and secondary tailings samples indicated limited probability of metals leaching out.

- URS attempted to identify the location where the radium impacted soils from the cleanup at 3rd and Pearl Streets in Boulder were disposed. URS identified this location based on "*direct observation of construction debris.*" (See Section 4.2.2 for additional information).

- URS investigated drums, tanks, and transformers remaining on the Property. Twenty-two unlabeled containers were identified and sampled. The samples included seven combustible substances, one corrosive base, one flammable liquid, and one reactive substance. Sampling of transformer oils indicated that the oil likely contained PCBs at concentrations greater than 50 parts per million ('ppm").

- CDPHE (1999a) had identified five areas with elevated radiation levels (Figure 6). These areas, as well as background areas, were investigated by URS. URS listed the maximum radiation readings for the five areas as follows: Area 1 (north of the primary dike dam) – 44 µR/hr; Area 2 (old slurry line) - 52 µR/hr; Area 3 (south of wood shop and tree stump) – 38 µR/hr and 170 µR/hr; Area 4 (area around the mill building) – 150 µR/hr; and Area 5 (ore storage area) – 80 µR/hr. Of these five areas, the greatest concentrations of lead, ranging from 1,600 ppm to 5,400 ppm, were found on the north side of the dike dam of the primary pond in the vicinity of the reported 1940 spill.

- Six existing wells are located on the east end of the Property with four of the wells completed in shale/claystone (MW-1, MW-2, MW-3, and MW-5). Monitoring well MW-4 is completed in colluvium. No lithologic information was provided in the report for monitoring well MW-6; however, based on its location the well is likely also completed in claystone or shale. Two monitoring wells (MW-2 and MW-3) completed in the shale south of the secondary tailings pond were dry. Groundwater flow in the area east of the secondary tailings pond was determined to be to the north.

- Groundwater samples were collected from seven monitoring wells and "*drinking water samples*" were collected from 12 domestic wells.

- URS reported that, "*Arsenic, chromium, lead, manganese, selenium, thallium, vanadium, and uranium were detected above at least one benchmark in one or more of the Terracon monitoring wells MW-1, MW-4, and MW-6.*" (These wells are located on the far eastern side of the Property from the south boundary to the north boundary, Figure 7). "*Most of the analytes detected above benchmarks may be at least partially attributable to the tailings deposits on site. In addition, the chemistry of the Pierre Shale influences groundwater quality and is noted for elevated concentrations of arsenic, molybdenum, selenium, sulfur, and uranium (Colorado Department of Agriculture Colorado Soil Conservation Board 1985).*"

- The inorganic analytical results for samples taken from 12 drinking water wells (VB-DW-01 through VB-DW-12) did not exceed benchmarks except for dissolved arsenic at 1.1 part per billion ("ppb") in the sample collected from the Melton/Mitchell well (VB-DW-06) located at 6029 Indian School Road. URS concluded the arsenic concentration identified in the Melton/Mitchell well was attributable to an upgradient source in the alluvial aquifer.

- Radiological drinking water standards were not exceeded in any of the drinking water samples.

- URS evaluated potential exposure pathways to onsite and offsite receptors including surface water, groundwater, soil, and air exposure pathways. URS did not identify any completed pathways. No additional characterization of potential groundwater movement from the Property was conducted or recommended, "… *contaminants that can be attributed to the site were not detected above benchmarks in drinking water*."

- URS summarized the results of the EPA (2004a) radiological survey in its report. URS indicated that EPA's radiological survey also confirmed the location of the five areas with elevated radiation levels identified by CDPHE (1999a).

- URS summarized the results of the EPA (2004b) evaluation of the soil covers for the tailings pond and disposal pit area. The EPA evaluation compared the soil covers on the tailings ponds and disposal pit to criteria for uranium site closure and none of the covers met the 1000 year criteria for erosion control. The primary tailings pond cover did not meet the 200 year erosion criteria for uranium sites. The radon flux standard, however, was met by all of the covers by an order of magnitude.

- URS summarized the results of a "screening level" risk evaluation of the Property completed by EPA (2005a). In its summary, URS reported, "*Risks to off-site human receptors are unlikely to be significant and that hazardous contaminants on site may pose a risk to potential on-site receptors. Risks to construction workers can be minimized with the implementation of an appropriate health and safety plan and engineering controls. Risk to future on-site workers can be minimized with the implementation of appropriate administrative and institutional controls, such as restrictions limiting or preventing worker exposure to surface or subsurface soils. Risks associated with Native American cultural practices (e.g., sweat lodge ceremonies) are also unlikely to be significant. Focused sampling of surface soils in the on-site area where such ceremonies are currently held indicate that concentrations of lead ranged from 46 to 72 ppm, significantly less than the residential screening level for lead (400 ppm).*"

- URS recommended that "*Surface areas identified as having high concentrations of radioactive substances or lead should be remediated as part of the development process. When the site is fully developed a radiological and lead survey may be advisable to address concerns related to hazardous materials being exposed as a result of development activities.*"

On behalf of the City, Terracon completed oversight activities on portions of the URS reassessment investigations. Terracon provided its finding in a report titled, *Limited Sampling and Analysis Report Hendricks Mining and Milling Site, Boulder County, Colorado* (Terracon, 2004). The report notes, "*The purpose of Terracon's work was to observe select parts of URS' field activities, and to collect split samples at a limited number of locations to provide the City of Boulder with data in advance of US EPA's publication of its results that could potentially affect the City's decisions relative to future uses of the site.*"

Split sample locations were decided jointly by the City of Boulder and Terracon and included, offsite groundwater samples, offsite domestic water well samples north of the Property, and sediment samples from Butte Mill Ditch north and west of the Property. In addition, Terracon observed drilling operations within the primary and secondary tailings ponds and other offsite areas. Split sample results were consistent with the URS (2005) data and "*did not exhibit concentrations of the parameters analyzed above the published limits used for comparison*". Water samples collected from domestic water wells indicated sulfate and chloride concentrations *in excess of the published limit used for comparison"*. Terracon noted, *"Sulfate and chloride can occur naturally in groundwater at elevated concentrations and may not be indicative of industrial impact"*.

4.4.10 Final Report Valmont Butte Hazardous and Industrial Waste Removal and Disposal. Prepared by S. M. Stoller Corporation for the City of Boulder, February 2, 2007

In October 2006, the City hired Stoller to dispose of certain wastes remaining at the Property. Some of these wastes had been identified by the EPA (URS, 2005) in its investigation of the Property in 2004. These wastes included PCB-containing electrical transformers, 55-gallon drums of unknown solids and liquids exhibiting hazardous characteristics, and 3,500 gallons of pine or vegetable oil.

Stoller began identifying, characterizing, and packaging wastes for removal at the Property in December 2006. Waste packaging was completed and all materials were shipped offsite for disposal by January 25, 2006. The following were removed from the Property:

- A total of 150 gallons of PCB-containing and PCB-impacted oil was shipped for disposal. The PCB oils were from transformers, capacitors, and condensers.

- An eighteen gallon fiberboard drum of sodium hydrosulfite was placed in a 55-gallon drum and shipped for disposal.

- Twenty-five overpack drums (80-gallon size) were filled with materials identified as hazardous at the Property. These included two drums of soil, one drum of Hyfac 400 which was used in the milling process, and 22 drums of other miscellaneous industrial wastes.

- Four automobile batteries were removed for recycling.

- 3,500 gallons of pine oil were mixed with 400 gallons of diesel and recycled as fuel oil.

- 470 gallons of oil/grease/water mixture were removed and recycled as fuel oil.

- One 55-gallon drum of used lubricating grease and oil was removed and recycled.

- Scrap metal was recycled.

4.4.11 Identification and Confirmation of Soils Requiring Long Term Management, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado. Prepared by Casey Resources, Inc. for the City of Boulder, November 24, 2009.

Investigations were completed during the summer of 2009 to assess the soil quality outside the boundaries of the primary and secondary tailings ponds in support of this VCUP Application. Specifically, the investigations were conducted to:

- Further define the areal extent and depth in soil of elevated radiation areas that were identified by CDPHE (1999a,1999b) and confirmed by URS (2005);
- Further define the areal extent and depth in soil of the elevated metal concentration areas identified by URS (2005);
- Screen the surface soil in the remainder of the Property for previously unidentified elevated metal and/or radiation areas; and
- Confirm that any waste materials remaining in onsite structures had been identified and sufficiently characterized.

Based on the Property's historical use and previous investigation results, lead was selected as the indicator parameter for environmental impact to soil. Approximately 1,000 X-ray fluorescence ("XRF") measurements were taken during the metals screening program. Approximately 679,600 square feet (15.6 acres) of the Property were identified as containing lead concentrations that exceeded the screening value of 800 mg/Kg for lead. The lead impacted areas also included the majority of arsenic concentrations identified that exceeded the previously established background concentration of 10 mg/Kg.

The depth of lead impact varied from a thin veneer (surficial) to greater than two feet in depth. The majority of the lead impacted areas identified during the investigations were determined to be surficial only. The thin veneer of surficial lead impact was likely generated by dust particulates associated with the crushing and milling operations and by wind erosion of the exposed tailings.

A radiation survey was also conducted. The radiation survey used state-of-the-art portable gamma radiation sodium iodide ("NaI") detection meters with real-time global positioning system ("GPS") equipment. The radiation survey involved traversing the entire Property on approximate 25 foot horizontal spacing with the radiation detectors situated at approximately three feet above the ground surface to simulate human "whole body" exposure conditions.

Previous radiation surveys completed at the Property utilized hand held field equipment with readings taken at or near the ground surface.

Over 115,000 data points were collected during the survey. These data were correlated to specific onsite radiation source measurements collected using a High Pressure Ion Chamber. Based on the data averaged over 25 square feet, the highest predicted exposure rate was 41.9 µR/hr. There were no exposure rates greater than the 68 µR/hr screening criteria established by CDPHE (48 µR/hr above background). Although the radiation survey did not identify radiation exposure rates greater than the screening level of 68 µR/hr, the survey confirmed the higher radiation rates recorded in the same locations previously identified by URS (2005).

5.0 EXISTING CONDITIONS

The following sections describe the current conditions at the Property and incorporate data and findings from the environmental reports discussed in Section 4.0.

5.1 SITE DESCRIPTION

The Property can be divided into three areas based on past land uses. These areas include the Mill Site, the primary and secondary tailings ponds, and the outlying vacant areas. Each of these areas are shown on Figure 2 and discussed below.

5.1.1 Mill Site

The historic mill structure and associated buildings, referred to hereafter as the "Mill Site," remain on the Property. These buildings include the main mill building, a garage, laboratory building, office building, and several miscellaneous buildings. Buildings eligible for the National Register of Historical Places are shown on Figure 3. None of the buildings or structures on the Property are in use. The Mill Site includes the area west of the mill building, including the former railroad spur alignment and a southwest trending gully. The Mill Site also includes the filled area to the east of the buildings. The Mill Site area extends from the western Property boundary to approximately 900 feet east of the mill building and encompasses an estimated area of approximately 18 acres. The Mill Site is approximately 30 feet higher in elevation than the primary tailings pond located to the east.

5.1.2 Primary and Secondary Tailings Ponds

The tailings generated from the processing of ores at the mill were deposited in two tailings ponds located in the central part (primary tailings pond) and eastern side (secondary tailings pond) of the Property. The areas of the primary tailings pond and the secondary tailings pond were estimated by URS (2005) at 12.5 acres and 4.5 acres, respectively. The primary and secondary tailings ponds are approximately 30 feet lower in elevation than the Mill Site located to the west.

Use of the primary and secondary tailings ponds is restricted by controls and specifications set forth in the "*Agreement and Declaration of Covenants*" (CDPHE, 1999c). The current covenant control boundary includes an area of 14.11 acres (CDPHE, 1999c).

5.1.3 Outlying Vacant Areas

The remainder of the Property, approximately 66 acres, is vacant land. This includes the Valmont Butte ridge and land area north to Valmont Road, open land areas east of the primary and secondary tailings ponds extending to the eastern Property boundary, and open land to the south of the primary and secondary tailings ponds. These outlying areas include sensitive cultural areas (possible Native American use and potential early pioneer burial).

5.2 TOPOGRAPHY

The predominant topographic feature on the Property is Valmont Butte, a volcanic rock outcrop that trends west to east along the north side of the Property. Valmont Butte rises nearly 200 feet above the surrounding terrain (URS, 2005). The ground surface on the north side of the Valmont Butte dips steeply to the floodplain of Boulder Creek. The south side of the Valmont Butte has gentler slopes in most areas.

The ground elevation of the Property varies from a high of approximately 5,389 feet AMSL on the top of the Valmont Butte on the northwest side of the Property to a low of approximately 5,190 feet AMSL on the northeast corner of the Property near Valmont Road. The Mill Site and south side of the Property are situated on a bedrock ridge with ground elevations ranging from approximately 5,260 feet to 5,300 feet AMSL. The land area between the bedrock ridge and Valmont Butte originally was a shallow erosional basin sloping to the east. This area is now occupied by the primary and secondary tailings ponds. Onsite drilling confirms that the bedrock elevation beneath the tailings ponds slopes to the east (URS, 2005). The land area west of the mill buildings slopes to the west-southwest and includes an erosional gully and former railroad spur alignment trending southwest.

Significant amounts of fill have been added to the portion of the Property east of the mill buildings and west of the primary tailings pond. This area has been backfilled with construction debris and graded flat for additional buildings and storage activities.

5.3 LAND USE

The Property is currently not being used, except the ridgeline is designated non-accessible Open Space to protect certain natural features. Access to the Property is controlled with fencing and locked gates.

5.4 GEOLOGY

The geology of the Property consists of the Valmont Butte volcanic dike located on the north side of the Property, and the Upper Transition Member of the Pierre Shale which underlies the Property (Figure 8). In the vicinity of the Property, the Upper Transition Member of the Pierre Shale consists of claystone underlain by shale (Terracon, 2003). Scott and Cobban (1965) indicate that the Upper Transition Member of the Pierre Shale ranges from 1,200 to 2,000 feet in thickness. The remainder of the Pierre Shale formation underlying the upper unit ranges from 3,200 feet to 6,800 feet in thickness and is composed predominantly of shale (Scott and Cobban, 1965). The surface expression of the Valmont Butte begins a few hundred feet to the west of the Property and extends approximately 1.5 miles to the east. URS (2005) indicates that the volcanic dike is three miles in length and rises up approximately 200 feet from the surrounding landscape. The volcanic dike is 20 to 40 feet wide and nearly vertical and consists of Shoshonite, a very potassium rich basaltic rock (Trimble, 1975). The basalt rock reportedly has columnar jointing in areas (URS, 2005) and the Upper Transition Member of the Pierre Shale adjacent to the dike has been metamorphosed. Based on the matrix of the volcanic dike and surrounding metamorphosed shale zone, the Valmont Butte acts as a barrier to groundwater flow. The Slocum Alluvium overlies the bedrock in the mill area and the south bedrock high. Maximum thickness of the unit is estimated to be 20 feet. The alluvium consists of silty sand and coarse gravel.

5.5 HYDROLOGY

Precipitation runoff from the Mill Site drains southwest to a ditch located along 63rd Street and Valmont Road. This stormwater drainage ditch flows under the Jones Donnelly Ditch into South Boulder Creek at the outlet of the KOA Lake (URS, 2005).

South of the Valmont Butte, precipitation runoff flows primarily to the east following the natural topography of the basin to a drainage located on the far eastern boundary of the Property. Runoff that drained onto the tailings pile would be captured behind the tailings ponds dams. The tailings consist of silt, clay, and very fine-grained sand, underlain by claystone and shale bedrock. All of these matrices are low permeability and high porosity materials that tend to absorb water, but do not transmit flow readily. As such, the majority of accumulated precipitation remains at the surface and evaporates. Some of the precipitation infiltrates; however, this water generally remains near the surface and eventually evaporates or it remains within the subsurface as localized perched groundwater within the tailings.

The drainage located on the far eastern boundary of the Property trends north-south and has eroded through the Valmont Butte. Elevation contours in this area indicate a topographic divide

with the highest elevation at approximately 5,225 feet AMSL (Figure 9). Prior to construction of the Valmont Reservoir dam (approximately 1961, [Tripp, Michael R., Callahan, William G. and Manik Hwang, editors, 1970]) located southeast of this area, precipitation runoff would have flowed either north or south from the top of the topographic divide. Once the Valmont Reservoir dam was constructed, surface water accumulated in the reservoir to an elevation of approximately 5,225 feet AMSL (Figure 10) and diverted the ditch flow north. As a result, subsurface seepage has occurred at the point of the former topographic divide and intermittent surface water discharges have developed over time in the erosional drainage north of the divide.

Precipitation runoff on the north side of the Valmont Butte is to the north. URS (2005) notes the precipitation runoff flows "*into the ditch on the south side of Valmont Road, and depending on flow direction, through one of two culverts under Valmont Road and under Butte Mill Ditch and into either the Ready-Mix pond or the Keeter pond on the north side of Valmont Road.*"

5.6 HYDROGEOLOGY

Regionally, the Pierre Shale contains only limited groundwater and the quality of the groundwater is poor. Alluvial groundwater is present north of Valmont Butte (Boulder Creek alluvial system) and likely within the drainage associated with the Xcel Energy power plant lakes (Valmont Reservoir, Leggett-Owen Reservoir, and Hillcrest Lake) located south of the Property. Groundwater evaluations have been completed at the Property on multiple occasions (URS, 2005; Terracon, 2003 and 2004; and Ecology and Environment, 1985). The information obtained during these investigations is adequate to assess the groundwater occurrence and quality underlying the Property.

5.6.1 Groundwater Occurrence

Groundwater has been identified within colluvium on the northeast side of the Property along Valmont Road and in claystone bedrock underlying the eastern portion of the Property. In addition, limited perched groundwater was identified in the primary tailings pond during the URS investigations (Section 4.4.9).

Ecology and Environment (1985) completed two borings at the Property as part of a planned groundwater investigation (Figure 7). The first boring, AC-GW#1, was drilled east of the Valmont Cemetery along the southwest boundary fence. The lithology encountered in this boring included brown silt, silty sand, and quartz gravels from the ground surface to approximately 35 feet bgs and gray shale of the Upper Transition Member of the Pierre Shale from 35 feet bgs to 45 feet bgs. The boring was terminated at 45 feet bgs without encountering groundwater. The second boring, AC-GW#2, was drilled immediately east of the primary

tailings pond dam in an area identified by geophysical testing to likely represent the paleochannel of the topographic basin. The lithology encountered in this boring included brown silt from the ground surface to approximately 10 feet bgs and gray shale of the Upper Transition Member of the Pierre Shale from 10 feet bgs to 30 feet bgs. The boring was terminated at 30 feet bgs without encountering groundwater.

Terracon (2003) drilled 12 borings at the Property (Figure 7). Information regarding the lithology encountered, depth to groundwater, and monitoring well screen depth interval are provided on Table 2.

Groundwater was encountered in only borings MW-1 and TB-2. The sporadic occurrence of groundwater suggests that groundwater in the claystone is limited to discontinuous lithologic lenses. The lithology recorded also suggests that the claystone thickness thins to the north and northeast.

Boring location MW-4, located in the northeastern corner of the Property also contained groundwater. MW-4 was completed in colluvium associated with erosion of the Valmont Butte.

Using the ground surface elevation provided on the Terracon lithologic logs, groundwater was first encountered in monitoring well MW-1 at 5,183 feet AMSL. After six hours the groundwater rose 11 feet to an elevation of 5,194 feet AMSL. Groundwater was not initially detected at location TB-2; however, after 10 days it was measured at 37.5 feet, an elevation of 5,194.5 feet AMSL. Based on this information, groundwater occurs under semi-confined conditions within the claystone at an elevation of approximately 5,183 feet AMSL, which is approximately 20 feet or more below the base of the tailings pond.

5.6.2 Groundwater Quality

The Terracon groundwater sample collected from monitoring well MW-1 indicated elevated concentrations for sulfate (3,150 mg/L), sodium (1,100 mg/L), and nitrate/nitrite (37 mg/L) which are expected for groundwater within marine claystone or shale. The detection of low concentrations of benzene (2.9 µg/L) and toluene (4.4 µg/L) can be attributed to the organic nature of the marine depositional environment. Of the metals, only total selenium was detected at 0.674 mg/L. Gross gamma radiation was reported at 2,820 pCi/L; however, 77% of this concentration was attributable to potassium-40 with no contribution from radium or uranium. Review of the soil data indicates that potassium-40 is naturally occurring in the Pierre Shale.

Boring MW-4 was drilled within the drainage area on the northeast corner of the Property and likely represents groundwater seepage from Valmont Reservoir. The groundwater sample from

MW-4 contained sulfate at 476 mg/l, sodium at 234 mg/L, and nitrate/nitrite at 0.5 mg/L. Of the metals, only barium at 0.24 mg/L was detected. Volatile organic constituents detected included 1,2,4-trimethylbenzene at 1.5 µg/L, chloroform at 10 µg/L, and m+p xylenes at 1.8 µg/L. Gross gamma radiation was reported at 1,620 pCi/L; however, 77% of the gamma radiation was attributable to possassium-40.

URS (2005) sampled groundwater from the existing onsite monitoring wells MW-1, MW-4, MW-5, and MW-6 (Figure 7). Monitoring well MW-5 is located northeast of MW-1 nearer the northeast drainage area and monitoring well MW-6 is located in the southeastern corner of the Property. Groundwater flow contours (URS, 2005) suggest a northward groundwater flow along the east boundary of the Property, which would make monitoring well MW-6 a background sampling point. The dissolved arsenic concentrations reported for MW-1 at 10.2 µg/L and MW-6 at 24.2 µg/L exceed the drinking water standard of 10 µg/L. Dissolved selenium concentrations in the same two monitoring wells at 531 µg/L and 1,330 µg/L, respectively, exceeded the drinking water standard for selenium of 50 µg/L. The concentrations for arsenic and selenium can be attributed to the marine environmental deposition of the source claystone bedrock. Dissolved lead concentrations for groundwater samples from the four monitoring wells were well below the drinking water standard of 15 µg/L. Concentrations for radium-226/228 and adjusted gross alpha exceeded the drinking water standard of 5 pCi/L and 15 pCi/L, respectively in monitoring wells MW-1, MW-4, MW-5, and MW-6.

URS (2005) noted that the "*chemistry of the Pierre Shale influences groundwater quality and is noted for elevated concentrations of arsenic, molybdenum, selenium, sulfur, and uranium (Colorado Department of Agriculture Colorado Soil Conservation Board 1985).*"

URS (2005) sampled 12 offsite drinking water wells located north of the Property. These drinking water wells are likely completed in alluvium associated with the Boulder Creek groundwater system. The results for these samples did not identify any exceedences of drinking water standards for metals, radium-226/228 or adjusted gross alpha attributable to the Property.

5.6.3 Groundwater Discussion

Based on the available information, limited perched groundwater exists in the primary tailings pond. Groundwater occurrence within the claystone unit immediately underlying the Property is sporadic and discontinuous. The bedrock groundwater is approximately 20 feet or more below the base of the tailings materials.

The fine-grained matrix of the bedrock deposits results in groundwater flow characteristics of low permeability and high porosity, which limit groundwater migration. The groundwater

samples collected from the existing onsite monitoring wells indicate significant chemical contribution from the marine deposits of the Pierre Shale.

A water well record summary was obtained from the Colorado State Engineer's Office for an approximate one-half mile radius surrounding the Property. The water well record summary data are provided in Appendix D. Based on the State Engineer data, there are 55 registered wells within the one-half mile search radius of the Property. The uses listed included irrigation (2), commercial (1), gravel pit (1), monitoring wells (17), abandoned monitoring wells (12), and domestic (22). The locations of these wells are presented on Figure D-1 in Appendix D. As discussed in Section 5.6.2, URS (2005) sampled 12 offsite drinking water wells located north of the Property and did not identify any exceedences of drinking water standards for metals, radium-226/228 or adjusted gross alpha attributable to the Property.

5.7 METALS AND RADIATION DISTRIBUTION AND CHARACTERIZATION IN SOIL

Environmental investigations of the Property were conducted in the summer of 2009 to further assess the soil quality at the Property (CRI, 2009a,b). These investigations included both metal and radiation screening surveys of soil. The results of these investigations are discussed in the following sections.

5.7.1 Metals Distribution and Characterization in Soil

A structured soil quality investigation was performed using field-portable XRF equipment and laboratory analysis for quality control checks. The XRF sampling program was the most comprehensive soil investigation completed at the Property to date. Approximately 1,000 XRF measurements were taken during the metals screening program. During the site screening investigation, approximately 679,600 square feet (15.6 acres) of the Property were identified as containing lead concentrations that exceed the screening value of 800 mg/Kg for lead (Figure 6). The lead impact areas identified included 16 out of the 18 sampling locations identified by URS (2005) as containing lead concentrations greater than 400 mg/Kg and three previously unidentified areas. The lead impacted areas also included the majority of arsenic concentrations identified that exceeded the previously established background concentration of 10 mg/Kg. The lead impact areas also include the five areas previously identified by URS (2005) as containing elevated radiation readings (Figure 6).

The limits of the mining residual areas shown on Figure 6 are not exact and as remediation work is performed, additional monitoring for metals and radiation exposure rates will be performed to ensure that all impacted areas are fully defined and remediated appropriately. The estimated

volumes of mining residuals requiring long term management are presented in Table 3. The depth of impact used to calculate mining residual volume is the maximum depth identified during the screening investigation within each area. Where the depth of impact was identified as greater than 2.0 feet, it was assumed that clean soil (lead concentration less than 800 mg/Kg) would be encountered within 4.0 feet. Therefore, a maximum depth of excavation of 4.0 feet was used in the volume calculations.

The land area between the covenant controlled tailings area and the prairie dog control fence was identified by EPA as potentially containing tailings material eroded from the primary and secondary tailings ponds or exposed by prairie dog activity. The results of the 100 foot grid lead survey and the results of the radiation rate survey conducted in this area indicate that lead concentrations were less than 800 mg/Kg at the ground surface and that radiation rates were less than or equal to approximately 30 µR/hr. These results suggest limited to no current impact in the 100 foot grid survey area from erosion or prairie dog infestation. URS (2005) identified several areas within the primary and secondary tailings ponds where the prairie dog infestation has disturbed the cover material and transported tailings to the surface. These areas (individual prairie dog holes) will need to be addressed during cap construction.

5.7.2 Radiation Distribution and Characterization in Soil

A radiation survey of the Property was conducted using state-of-the-art portable gamma radiation NaI detection meters with real-time GPS equipment. Over 115,000 data points were collected during the survey. These data were correlated to specific onsite radiation source measurements collected using a High Pressure Ion Chamber. Based on the data averaged over 25 square feet, the highest predicted exposure rate was 41.9 µR/hr. There were no exposure rates greater than the 68 µR/hr screening criteria established by CDPHE (48 µR/hr above background).

Although the current investigation did not identify radiation exposure rates greater than or equal to the screening level of 68 µR/hr, the survey confirmed higher radiation rates in the locations previously identified by URS (2005). As shown on Figure 6, the five areas of elevated radiation at ground level identified by URS are co-located with areas identified as containing lead concentrations greater than 800 mg/Kg. As a result, the elevated radiation areas identified by URS will be mitigated along with the lead impact during remediation activities.

5.7.3 Discussion of Mining Residual Impacts

The majority of mining residuals at the Property are contained in the primary and secondary ponds. In the 1990s, the tailings ponds and adjacent areas were reportedly covered with soil. This soil cover does not appear to have been specifically designed or engineered, and as

described in available documents, involved placement of "soil" of undocumented quality on the tailings. URS (2005) documented a variable thickness of the cover across the tailings ponds. Since placement, the cover materials have also been eroded by wind and water and further compromised by prairie dog activity.

Lead impact exists at various locations on the Property outside of the primary and secondary tailings ponds. Much of the lead impact is believed to be resultant of wind-blown materials from the tailings ponds. The north hillside of Valmont Butte, with the exception of the area below the primary dike dam, and the area south and east of the primary tailings pond appear to have been impacted by wind-blown mining residuals.

An area on the north slope of Valmont Butte exhibited elevated lead concentrations and elevated radiation exposure levels. This impacted area is the same area identified by URS (2005) as the location of the reported 1940 spill. This area was partly remediated along Valmont Road during a construction project. This remediation activity removed an estimated 300 tons of mining residuals (CDPHE, 1984b).

The area east of the mill building, where the garage, office, and laboratory buildings are located, was previously backfilled and graded level. Below the surface soil, the backfill material consists of construction debris and cobble size rocks. In some areas fluoride crystals and purple coloring were identified in the backfill, suggesting the backfill includes fluorspar waste rock or possibly discarded ore material. This area exhibits elevated lead concentrations in the soil to depths of 18 inches.

The sloped areas, southwest of the garage and south of the mill building, contain elevated lead concentration in the soil to depths of at least 24 inches near the bottom of the slope. It is likely that over the many years of milling operations stormwater runoff transported mining residuals down the slope and deposited it in this nearly flat area. Mr. Hendricks also reports that lead and zinc concentrates from the mill were placed on the ground surface in this area to dry (Hendricks, 2006).

Several other small isolated areas across the Property have been found to have elevated concentrations of lead in soil as well.

The lead and radiation screening completed during the CRI investigation identified 14 areas containing mining residuals outside the tailings ponds, indicating that previous remediation activities at the Property were insufficient and/or ineffective. Mining residuals were not identified in surface soil adjacent to the primary and secondary tailings ponds indicating that prairie dog activity on the tailings ponds had not impacted adjacent areas.

5.8 METALS AND NORM IN BUILDING INTERIORS

The interior of all the buildings on the Property were examined for lead levels above the 800 mg/Kg screening levels and for radiation levels above the 68 µR/hr exposure rate screening level. These measurements were taken by XRF and a Canberra Instruments model Radiagem 400 exposure rate meter with SG-1R survey probe, respectively.

Approximately one half pallet of bagged ore samples were located in the mill building that exhibited lead concentrations greater than 800 mg/Kg when analyzed by XRF. No other lead impacted materials were found in the buildings.

As with the field surveys, the radiation exposure rate surveys in the buildings were taken from approximately three feet above the floor (waist high). Radiation exposure rates in all buildings except the laboratory building were near background rates. Within the laboratory building (same area as the CDPHE "wood shed"), exposure rates approached the screening level of 68 µR/hr. Radiation exposure rates of between 50 and 60 µR/hr were measured in a narrow area running north to south in the eastern most room of the building. These readings may be attributable to a radioactively impacted drain under the concrete floor. All other buildings exhibited minimal radiation exposure levels.

The laboratory building will be demolished as part of the remediation. Once the concrete floor has been removed as part of building demolition, the underlying soil will be tested (field screened for metals and radiation exposure rates) and, as appropriate, excavated and consolidated in the primary tailings pond.

6.0 RISK EVALUATION

Applicants under the State of Colorado's Voluntary Cleanup Program are required to consider the potential current and future risks to human health and the environment associated with exposure to contaminants identified at the Property. The mining residuals present at the Property are known to contain concentrations of lead and arsenic that exceed the State of Colorado's Soil Evaluation Values for residential and commercial (worker) exposure. In addition, exposure to low-level radiation associated with excavation and grading surface materials in the course of remediation is also a concern for remediation personnel.

For the intended land use of non-accessible Open Space/Open Use, the proposed capping strategy for mining residuals, whether by consolidation in the primary tailings pile or by capping in place, will eliminate the direct exposure pathway. Access and use controls, including the covenants will further limit access and potential exposure.

In its evaluation of "risks", URS concluded that, "*Potential receptors off-site include nearby residents, domestic and commercial groundwater users, cemetery visitors, consumers of farm produce, workers, wetlands, wildlife, fisheries, and city of Lafayette drinking water users*". URS (2005) also concluded that, "*No complete pathways were identified during this investigation*".

6.1 POTENTIAL RECEPTORS

The incremental risks of exposure to impacted media (mine residuals/tailings) relate to four potential receptor groups. These groups are:

- Construction Worker use during remediation;
- City Worker accessing open use areas to deliver, pick up, or maintain equipment and materials stored at a particular location. No equipment or materials will be stored within capped areas;
- Tribal Use; and
- Mill Area Use

The potential exposure associated with each receptor group or area is discussed in the following sections. It is important to note that the general public is not considered as a risk receptor as the Property will not generally be accessible to the public, and any public access will be limited and

controlled. The Valmont Butte ridgeline site is intended to be an "open space vista" with no trails or paths given the Property's difficult terrain and the need to protect existing vegetation.

6.1.1 Construction Worker

Construction workers potentially would be exposed to mining residuals during the remediation phase of the project. The exposure pathways to the construction worker would include dermal contact, inhalation, and potentially ionizing radiation pathways. Specific regulatory requirements for worker training and protection are addressed in the Remediation Plan (Section 7.0) of this VCUP Application, which includes specific health and safety protocols, material management planning, and engineering controls. Typically, the greatest exposure potential to mining residuals will occur for those construction workers on the ground (laborers and grade checkers). The least exposure potential will be to the equipment operator operating equipment from an enclosed cab at some elevation above the working surface. Most work will be completed with hydraulic excavators and loaders with little manual labor applied to earth moving activities. The exposure potential to all construction workers will be at its greatest during the excavation and consolidation of tailings materials.

Through institution of health and safety protocols, material management planning, and engineering controls, exposure during remediation activities will be limited to workers involved in the excavation of mining residuals (soils in areas exhibiting elevated metals concentrations) and, as such, these workers will be required to have the necessary training and required medical monitoring to comply with Occupational Safety and Health Administration ("OSHA") 1910.127. OSHA regulations require that all personnel in the work zone be dressed in the appropriate level of protection for the identified chemicals of concern and work activity. Personnel air monitoring will be conducted by the remediation contractor at the initiation of remedial activities at the Property to insure the proper level of personal protective equipment ("PPE"). From time to time during the project, personnel air monitoring will verify that the proper level of PPE is being worn.

6.1.2 Open Use City Worker

The open use city worker will have limited exposure potential as the open use areas will have been remediated to at least commercial cleanup values. These areas may also have use-related features to limit future soil disturbance (e.g., paving or road base type material may be used to define "yard areas" for the storage of equipment or material to be accessed by City staff). The existing water supply well located south of Valmont Road will be properly abandoned (See Section 7.2.10). As needed, drinking water for the city worker will be provided from an offsite source.

6.1.3 Tribal Use

Once the consolidation of mining residuals is complete, the exposure potential to residuals exceeding State cleanup values will be limited to only those areas where no consolidation activity occurred and mining residuals remain at or near the ground surface due to steep topography, physical constraints such as building foundations, and culturally sensitive areas.

Institutional controls will be utilized to limit exposure in culturally sensitive areas that may not be disturbed and remediated. A protocol will be developed with input from Native American representatives to define the necessary controls.

6.1.4 Mill Site Use

The Mill Site area, including the mill building and other buildings having historical significance (Figure 3), has the potential of becoming a museum or commercial use area in the future. The Mill Site area will be remediated to at least commercial cleanup values which is consistent with this possible land use from an exposure perspective.

6.2 SOIL ACTION LEVELS

Soil cleanup levels for the Property will be based on the CDPHE proposed worker (commercial) use soil cleanup value of 800 mg/Kg for total lead. The five elevated radiation areas previously identified by URS (2005) are located in areas that will be remediated for lead impact or will have established access and use controls. In addition, elevated arsenic concentration typically accompanied elevated lead concentration areas. In most cases, arsenic concentrations in excess of 50 mg/Kg are co-located with the lead concentrations in excess of the 800 mg/Kg action level and therefore will be managed along with the lead. Arsenic concentrations less than 50 mg/Kg will have limited exposure potential given the proposed land use, and access and other use restrictions.

7.0 VALMONT BUTTE REMEDIATION PLAN

The tailings ponds contain mining residuals generated from fluorspar and gold processing activities. The history of these processing activities is documented in this VCUP application. Mining residuals generated from both processes contain certain metals, including lead, which this plan uses to delineate areas requiring remediation. The fluorspar tailings also have a radioactive signature. The tailings ponds were never properly closed and capped. Prairie dog encroachment is also a concern, although based on site assessment data the impacts are limited, at this point, to the tailings pond areas.

There is little documentation supporting the capping effort reportedly conducted in the 1990s and URS, in 2004, found significant variability in the cap thickness from zero to 2.0 feet (URS, 2005). Site investigations completed in 2009 also identified mining residuals outside of the primary and secondary tailings pond areas. The mining residuals contain concentrations of metals that exceed the State of Colorado's proposed soil cleanup values for non-accessible Open Space/Open Use land designations. Excavation and consolidation of these mining residuals in the primary tailings pond area and the installation of an engineered cap that will withstand erosion and the infestation of prairie dogs is the proposed primary remediation strategy. This strategy, coupled with institutional controls, will be protective of human health and the environment for the intended land use of the Property (non-accessible Open Space/Open Use). The existing covenants boundaries will be modified where necessary. As a secondary mining residuals stabilization approach, capping in place may be necessary at culturally sensitive areas. Heavily vegetated areas that contain concentrations of lead that exceed the proposed action level of 800 mg/Kg, such as the north slope of Valmont Butte, will be left undisturbed to maintain the existing vegetative growth as a permanent protective cover against erosion. These areas, along with those areas requiring excavation and consolidation, are identified on Figure 11. Also shown on Figure 11 are the five areas identified in previous studies as having elevated radiation exposure rates outside the tailings pond area that are co-located with areas exhibiting elevated lead concentrations and will be managed during remediation.

7.1 PLANNING AND DESIGN

The remedial approach for the Property under the Voluntary Cleanup Program is to isolate historic mining residuals from the environment in a manner that is consistent with the land use (non-accessible Open Space/Open Use) for the Property. The following provides a design basis and requirements for this remediation.

The Property has been characterized for heavy metal and radiological impacts. In addition to the tailings ponds themselves, areas outside of the primary and secondary tailings pond areas have been identified that require management.

The three management strategies considered for handling mining residuals identified in these areas include: 1) excavation and consolidation of mining residuals in the primary tailings pond area, 2) capping mining residuals in-place, and 3) an institutional controls strategy in those areas where elevated metals concentrations have been detected at surface but significant vegetation and/or other physical, cultural, or historical constraints exist.

This remediation must satisfy various regulatory requirements and requires certain State and County approvals, including storm water management; drainage, erosion, and dust control; grading; and worker protection. These requirements will be addressed as design elements for the VCUP work. Other aspects of the planning and design effort will address decontamination and demolition of existing structures, dam safety compliance, and vegetation plans for areas that are disturbed during remediation. The tailings dam for the primary tailings pond is a State Jurisdictional Dam. State Engineer approval will be required to grade in the vicinity of the dam as part of the remediation design effort. Once these design elements are complete, a comprehensive design package will be assembled to support three activities:

- Secure the approval of Boulder County under its Limited Impact Special Use Review process and associated approvals required for construction.

- Provide a technical specification and remedial design for competitive bidding by prequalified contractors consistent with the City of Boulder's Procurement process and associated contracting requirements.

- Provide the basis of a Quality Assurance Plan to be used during remedial plan implementation which will allow for VCUP certification under the Voluntary Cleanup Program.

The new tailings pond cap design is described in Section 7.2.4 and will consist of two feet of clean soil overlain by 1.5 feet of rock (or possibly other material).

All disturbed areas outside of the tailings pond location will be vegetated once site grading is complete. A site specific seed mix design shall be prepared that combines native grasses with other species intended to provide a formidable root system to promote fast growing protective cover surfaces. Areas with existing vegetative cover will be inspected to ascertain if any additional seeding is required to augment the existing vegetation.

Institutional controls, including fencing, will be put in place to control access where needed. The boundaries of the existing environmental covenant will be amended as needed to address the tailings pond area.

7.2 MATERIALS MANAGEMENT PLAN (MMP)

The following sections specify how mining residuals will be handled and define the materials management plans for VCUP implementation. Any deviations from the approach outlined here to accommodate field conditions will be documented in the Remediation Construction Completion Report.

7.2.1 Management of Mining Residuals

Mining residuals will be managed in accordance with one of the three management strategies:

- Excavation and consolidation of mining residuals in the primary tailings pond;
- Capping in place mining residuals that exceed the cleanup level of 800 mg/Kg; and
- Institutional controls in areas where surface soils exceed the 800 mg/Kg cleanup value but heavy vegetation is present and/or other physical, cultural, or historical constraints exist.

Areas of elevated metals to be remediated are indicated on Figure 11. The secondary tailings pond area will be consolidated into the primary tailings pond. Identified areas that are accessible with heavy equipment and not located in culturally sensitive and/or heavily vegetated areas will then be excavated and moved to the primary tailings pond and consolidated with existing tailings at that location. It is anticipated that conventional excavation means and methods will be employed, including the use of loaders, skid steers, tandem and/or end dump trucks. Small scrapers may be employed for some of the larger areas requiring consolidation such as the secondary tailings pond area.

Table 3 provides an estimate of the volume of mining residuals requiring excavation from the secondary tailings and other onsite areas outside the tailings ponds (See Figure 6 for location of mining residual areas). The excavated mining residuals will be consolidated on the primary tailings pond.

Those areas considered culturally sensitive that do not exhibit active vegetation will be addressed through capping or institutional controls.

Heavily vegetated areas are located on the north slope of Valmont Butte (referred to as the "North Slope Area") and the area immediately south of the access road adjacent to the southeastern most area of the primary tailings pond. These areas will be left undisturbed.

7.2.2 Grading of Consolidated Mining Residuals

The mining residuals excavated and moved to the primary tailings pond will be used to regrade and contour the primary tailings pond so that precipitation runoff is directed to the south of the primary tailings pond location, where it can be collected and routed to a temporary storm water retention area identified on Figure 11. The grading will be completed in accordance with the approved grading plan which will be engineered to promote drainage of precipitation runoff. The mining residuals will be compacted in a manner and to a specification that will support the consolidated tailings area cap and promote runoff. Approvals from the State Engineer will be acquired that allow for grading activities within 200 feet of the primary tailings dam. Location and elevation surveys will be conducted to document both the horizontal and vertical extent of mining residual placed in the consolidated tailings pond.

7.2.3 Confirmation Sampling and Analysis

Confirmation soil sampling will be conducted on a systematic grid basis in all areas where mining residuals are removed, consistent with the site-wide characterization previously conducted (CRI, 2009a,b). Excavation in those areas where confirmation results indicate a lead concentration less than 800 mg/Kg will be considered complete. Grids where the lead concentrations still exceed 800 mg/Kg will have additional mining residuals removed until a lead concentration less than 800 mg/Kg is measured. All measurements will be conducted using a XRF device calibrated to accurately measure lead concentration. For quality assurance purposes, confirmation soil samples will also be collected for laboratory analysis consistent with the frequency specified for the site investigation conducted by CRI in 2009. This includes analyzing one in every 20 confirmation samples taken for RCRA metals using EPA Method 6010. The XRF generated lead concentration will be compared on an ongoing basis with the laboratory lead concentration to assure that there is reasonable correlation. A sampling and analysis plan is attached to this VCUP (Appendix E) that provides the specific procedures for using the XRF.

7.2.4 Cap Construction

Following the consolidation and compaction of mining residuals in the primary tailings pond, the cap will be constructed. The first layer of the tailings pond cap will consist of two feet of clean soil. All soils imported to the Property will meet an Import Soils Protocol which is attached as Appendix F. Additional cover material, most likely rock or other appropriate material, will be

imported to the Property and placed over the soil cap. The rock will meet specific size specifications (12-inch plus on average with a range of 6-inches to 18-inches in diameter) and will be placed to a minimum depth of 18-inches. The variation in the size of the rock will minimize the void spaces in the cover. The design criteria for the cover material associated with the cap will be based on which material will be best suited to making the tailings pond area least attractive to the prairie dog as habitat and minimizing long term operation and maintenance requirements.

The soil layer of the cap will be placed and compacted in accordance with geotechnical requirements developed during the design phase. The rock layer of material will then be carefully placed to maintain the integrity of the soil cap while meeting the specified depth of rock layer (minimum 18-inches). A quality control survey of the cap thickness will be conducted to confirm and document the thickness of soil and rock placement associated with the cap. This survey will include survey points (both elevation and horizontal points) of the following surfaces:

- The mining residuals;
- The clean soil cap layer; and
- The top rock layer.

The survey data shall be transferred onto an as-built drawing of the consolidated tailings pile for presentation in the Remediation Construction Completion Report.

7.2.5 Construction Controls

Construction controls will be in place and maintained during the relocation and capping of mining residuals consistent with regulatory requirements. These controls include:

- Dust control, including daily site watering as needed to control dust from active work areas and/or the application of surfactants and soil stabilizers in areas that do not have active grading and/or excavation operations.
- Erosion controls, including the strategic placement of silt fencing and other Best Management Practice ("BMP") features.
- Temporary fencing or prairie dog relocation to control prairie dog activity in remediation areas.

- Perimeter air monitoring for particulate matter, lead, and radiological parameter concentrations, consistent with EPA's letter to the City dated February 24, 2005 recommending air monitoring during construction activities (EPA, 2005b), to ensure that the contractor's dust control program is sufficient. An air monitoring plan will provide the specifics for locating air monitoring stations and implementing the perimeter air monitoring program.

7.2.6 Prairie Dog Management During Construction

The remediation contractor will be responsible for the management of prairie dogs during the remediation phase of the work. Location and installation of temporary prairie dog fencing shall be the responsibility of the contractor so as to prevent prairie dog activity in remediation areas. Monitoring of prairie dog activity and approved eradication shall be the responsibility of the City as part of its current management program.

7.2.7 Storm Water Management Plan Implementation

An approved Storm Water Management Plan ("SWMP") will be implemented in advance of any grading activities in compliance with all regulatory requirements. The SWMP will require the strategic location of BMP controls such as silt fencing, rock socks, hay bales and vehicle tracking pads that will control the precipitation runoff from the Property. The SWMP will be part of the design package.

7.2.8 Site Drainage Structures

Two temporary storm water retention areas will be sized and constructed to handle precipitation runoff from the consolidated tailings pile area and the mill site area. Outlet structures from the retention ponds will be directed to discharge into existing natural drainages on the Property. The retention ponds will be constructed in areas where lead concentrations in soil have been determined to be less than 800 mg/Kg and radiation levels are less than the 68 µR/hr screening criteria established by CDPHE. Any overflow discharge water will be sampled for RCRA metals (totals), gross alpha and radium-226. Sizing and construction requirements for the temporary retention areas will be included in the final design package. These storm water retention areas will be removed from service upon the completion of remediation activities.

7.2.9 Existing Structure Decommissioning/Demolition

Several structures exist on the Property including the mill and laboratory buildings, the clock tower building, work sheds and the scale house. There are also out buildings on top of the Valmont Butte, where the cistern was located. The buildings identified to have historical significance are the mill, ore mixing bin, and clock tower/southern pump house (Figure 3). These buildings will likely remain and may require further decontamination and refurbishing beyond the scope of this VCUP to support possible historic designation and possible future non-residential use. Other structures including the laboratory and scale house will be decontaminated as necessary, demolished and demolition debris will be properly disposed offsite. Soils underlying the structures to be demolished will be assessed during the remediation phase to assure that the soils action levels are met for lead and NORM. A formal specification for the demolition of the buildings will be provided as part of the final design package.

7.2.10 Closure of Existing Well Adjacent to Valmont

The existing well located on the Property adjacent to Valmont Road that was used to supply water to the mill and associated buildings will be closed by sealing with bentonite and 'flowfill' to provide a cap in accordance with State requirements. The closure will be documented with the State Engineer's office.

7.3 CONSTRUCTION WORKER SAFETY

All personnel involved in the handling of the mining residuals will have the training required by OSHA (1910.127) and site specific radiological awareness training for handling and exposure to potential low level radiation (NORM) and heavy metal impacted soils. A site specific health and safety plan will be prepared that details requirements for worker protection during construction. The remediation contractor will also be required to have its own site specific health and safety plan.

A radiological technician will be onsite during excavation and consolidation operations. Certain workers will be monitored on a daily basis for exposure to metals and radiation. Typically, those workers with the greatest exposure potential (laborers, grade checkers, and equipment operators) will undergo such surveillance. It will be the responsibility of the remediation contractor to perform the monitoring and insure that all workers are in the proper level of protection (i.e., each worker is wearing the appropriate personal protective equipment given the levels of exposure detected). It is anticipated that the excavation and consolidation of mining residual will be initiated in an elevated level of protection (e.g., Level C, which includes respiratory breathing protection) and potentially downgraded to a reduced protection level based on personnel air

monitoring results. Worker health and safety and awareness training certificates, including medical monitoring records, will be kept on file by the contractor at the work site and will be updated when construction related personnel enter and exit the project.

7.4 DECONTAMINATION

A decontamination area will be designated on the Property that will be used for equipment, tools, and personnel decontamination, as appropriate. The first step in decontamination is to avoid unacceptable personal exposure. All personnel working in impacted areas will be required to minimize contact with and exposure to mining residuals by following required PPE use. The health and safety officer for the project will establish specific decontamination procedures for workers, likely including equipment drop station, wash stations, PPE disposal station, and support station.

Heavy equipment that is exposed to mining residuals will remain in the impacted areas and designated roadways to limit further distribution and cross contamination in areas considered not impacted. Heavy equipment will be decontaminated when removed from an area considered impacted and from a remediation activity having to do with the management of mining residuals. If necessary, physical cleaning of the equipment payload areas (e.g., loader bucket, truck bed) will be implemented to remove soil clods. All vehicles exiting the Property will be required to have all loose soil and soil clods removed from tires and undercarriage. A decontamination pad will be set up for heavy equipment based on the site conditions and the nature of remediation that the equipment is involved.

7.5 REMEDIATION ACTIVITY REPORTING

All management and consolidation of mining residuals, radiological monitoring, cap installation, perimeter air monitoring and worker protection monitoring activities will be carefully documented for inclusion in a Remediation Construction Completion Report. This document, along with a certification of completion statement from an environmental professional stating that this Remediation Plan was fully and properly implemented will provide the basis for a No Action Determination request by the applicant to CDPHE once remediation activities are complete.

7.6 POST REMEDIATION OPERATIONS & MAINTENANCE PLAN

An operations and maintenance ("O&M") plan will be prepared which addresses the following:

- Cap inspections to assess potential erosion due to naturally occurring weather conditions or prairie dog intrusion. Prairie dog management will be ongoing, although it is

anticipated that the rock installed on the top of the soil cap layer will withstand any significant prairie dog encroachment and minimize maintenance requirements.

- Vegetation inspections in those areas left undisturbed during remediation activity.

- Drainage inspections will be conducted to look for any specific wash out areas that could undermine the capped areas.

8.0 GROUNDWATER MONITORING PLAN

A groundwater monitoring plan has been developed for the Property in light of the following:

- Limited groundwater occurrence has been identified onsite;
- No offsite impacts have been identified or documented; and
- Once mining residuals excavation, consolidation, and capping is completed and precipitation runoff is improved, precipitation infiltration into the capped tailings pond will be minimal.

The groundwater monitoring program will include sampling of the existing monitoring well network at the Property, which includes monitoring wells MW-1 through MW-6 (Figure 7), after completion of the VCUP remediation activities. These monitoring wells, last sampled by URS in 2004, will be surveyed to confirm they are still intact and are in good condition. Groundwater sampling will follow established sampling protocol and all purge water will be contained. Groundwater samples will be analyzed for dissolved RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) and radiation parameters of gross alpha, beta, and radium-226/228.

9.0 REFERENCES

Acclaim Environmental Services, Inc. (Acclaim), 2001: *Asbestos Abatement, Valmont Butte Site Mill Building, 3000 North 63rd Street, Boulder, Colorado.* August 7, 2001

Alisto Engineering Group, 2000: *Phase I Environmental Site Assessment of the Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado*. September 18, 2000.

Allied Chemical Corporation, 1971: *Application for Radioactive Material License*. August 3, 1971.

Allied Chemical Corporation, 1975: Letter from Allied Chemical Corporation to CDPHE Regarding *Letter of Aug. 15, 1975*. August 22, 1975.

Boulder City-County Health Department currently Boulder County Department of Public Health (BHD), 1972: Memorandum from BHD to Colorado Department of Health Regarding *Allied Chemical Co. – Valmont Mill Status Report and Summary*. October 24, 1972.

BHD, 1973a: *Special Environmental Health Report*. March 8, 1973.

BHD, 1973b: Letter from BHD to Boulder Department of Development Regarding *Allied Chemical Installation at 63rd and Valmont Drive*. September 12, 1973.

BHD, 1975: *Special Environmental Health Report*. April 30, 1975.

BHD, 1976: *Special Environmental Health Report*. November 1, 1976.

BHD, 1977: *Water Supply Inspection Report*. November 9, 1977.

BHD, 1982: *µR Meter Survey of Hendricks Milling Site Formerly Allied Chemical – Settling Ponds*. September 14, 1982.

BHD, 1985a: *Special Environmental Health Report*. April 11, 1985.

BHD, 1985b: *Special Environmental Health Report*. November 7, 1985.

BHD, 1986: Letter from BHD to Tusco Corporation Regarding *Boulder Milling Company Tailing Pond*. March 28, 1986.

City of Boulder, 2002: *Memorandum of Understanding*. August 17, 2002.

City of Boulder, 2007a: City of Boulder Memorandum Regarding *Study Session – January 30, 2007 Update on Disposition of Valmont Butte Property and Associated Issues*. January 19, 2007.

City of Boulder, 2007b: Letter from the City of Boulder City Manager to Rocky Mountain Peace and Justice Center Regarding *Concerns About the Valmont Butte Site*. December 21, 2007.

City of Boulder, 2008: Letter from the City of Boulder Public Works to CDPHE Regarding "*Proposed Actions Schedule Extension Request*". January 16, 2008.

City of Boulder, 2009: *City of Boulder's Response United States Environmental Protection Agency, Region8 Request for Information Hendricks Mining and Milling/Valmont Butte Site – Boulder, Colorado*. December 18, 2009.

City of Boulder web page: http://www.bouldercolorado.gov/

Colorado Department of Health currently the Colorado Department of Public Health and Environment (CDPHE), 1966a: *Colorado State Department of Public Health Division of Sanitation Industrial Wastes Lab Report.* Sample collected January 28, 1966.

CDPHE, 1966b: *Colorado State Department of Public Health Division of Sanitation Industrial Wastes Inventory.* November 22, 1966

CDPHE, 1967: Letter from CDPHE to General Chemical Plant Discussing Sampling Event Conducted on February 14, 1967. March 31, 1967.

CDPHE, 1969: Letter from CDPHE to Allied Chemical Corporation Discussing Data Omitted From Letter Dated September 24, 1969. October 2, 1969.

CDPHE, 1970: Letter from CDPHE to Allied Chemical Corporation Discussing Sampling Event Conducted on October 1, 1970. November 10, 1970.

CDPHE, 1971a: Letter from CDPHE to Allied Chemical Corporation Discussing Sampling Event Conducted on March 31, 1971. July 12, 1971.

CDPHE, 1971b: *Radioactive Materials License (Colo. 117-01) for Allied Chemical Corporation.* August 17, 1971.

CDPHE, 1971c: *Radioactive Materials License (Colo. 117-01) – Amendment No. 1.* October 22, 1971.

CDPHE, 1971d: *Radioactive Materials License (Colo. 117-01) – Amendment No. 2.* December 6, 1971.

CDPHE, 1972: *Industrial Waste Water Facility Inspection Sheet.* August 17, 1972.

CDPHE, 1977: *Radioactive Materials License (Colo. 329-01 for Hendricks Mining Company).* April 4, 1977.

CDPHE, 1979: *Water Quality Data, B-1 Miller Residence/B-2 Keeter Residence.* September 6, 1979.

CDPHE, 1980: Inter-Office Communication: *Financial Surety Aspects November 27, 1979; December 11, 1979.* February 3, 1980.

CDPHE, 1981: *Chemical Analysis Drinking Water, Miller Residence.* November 10, 1981.

CDPHE, 1983a: Letter from CDPHE to Hendricks Milling Regarding *Addition of Other Material to the Valmont Pond Colorado Radioactive Materials License #274-01S*. February 15, 1983.

CDPHE, 1983b: Letter from CDPHE to Hendricks Milling Regarding *Our February 15, 1983 Authorization to Receive Waste Material from Strategic Metals International*. April 19, 1983.

CDPHE, 1984a: Letter from CDPHE to EPA Regarding *Hendricks's Radioactive Fluorspar Tailings Pile.* June 12, 1984.

CDPHE, 1984b: CDPHE Inter-Office Communication Regarding *Valmont Roadside Clean-up.* June 14, 1984.

CDPHE, 1984c: Letter from CDPHE to Hendricks Milling Company Regarding *Your Letter to Hal Toland (i.e. State Highway Department).* June 14, 1984.

CDPHE, 1984d: *Water Quality Data, Miller Residence/Keeter Residence.* June 27, 1984.

CDPHE, 1984e: Letter from CDPHE to Hendricks Milling Company Regarding *Your Letters of June 14 and 21, 1984.* July 19, 1984.

CDPHE, 1988: Letter from CDPHE to Hendricks Mining Co. Inc. Discussing Colorado Solid Waste Regulations, EPA Investigations, and Radioactive Materials License. February 18, 1988.

CDPHE, 1995: Letter from CDPHE to Valmont Butte Corporation Discussing Review of the Radiation Control Division Files with Respect to Radioactive Materials License. June 1, 1995.

CDPHE, 1999a: *Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division, Uranium and Special Projects Unit, Technical Evaluation of Surface Gamma Radiation Survey, Valmont Butte Corporation Site, Boulder, Colorado*. July 27, 1999.

CDPHE, 1999b: *Decision Analysis: Assurance of Equivalent Protection to Public Health and Environment in the Absence of a Colorado Radioactive Materials License, for Valmont Butte Site, Valmont Butte Corporation, Boulder, Colorado*. October 6, 1999.

CDPHE, 1999c: *Agreement and Declaration of Covenants.* October 12, 1999.

CDPHE, 2004: *First Amendment to the Agreement and Declaration of Covenants for the Valmont Butte Property dated October 12, 1999*. August 2004.

CDPHE, 2007: *Table 1 Colorado Soil Evaluation Values (CSEV).* December 2007.

Casey Resources, Inc. (CRI), 2009a: *Revised Work Plan - Identification and Confirmation of Soils Requiring Long Term Management.* May 13, 2009.

CRI, 2009b: *Identification and Confirmation of Soils Requiring Long Term Management, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado*. November 24, 2009.

Ecology and Environment Inc. (E&E), 1984: Memorandum Regarding *Reconnaissance Visit to Hendricks' Mill, Boulder, Colorado (TDD R8-8408-18).* December 31, 1984.

E&E, 1985: *Sampling Activities Report for Allied Chemical Tailings Pond, Boulder, Colorado.* March 25, 1985.

Environmental Protection Agency (EPA), 1984: Memorandum Regarding *Tailings Pond Reclamation.* June 5, 1984.

EPA, 1985a: Memorandum Regarding *Field Investigation at Former Allied Chemical Company Mill*. February 25, 1985.

EPA, 1985b: Letter from EPA to Mr. J.W. LaFollette Regarding *Radioactivity of Fluorspar Tailings.* March 6, 1985.

EPA, 1985c: Memorandum Regarding *Partial Radioactivity Results/Allied Chemical*. March 8, 1985.

EPA, 2001: E-Mail Correspondence Regarding *Valmont Buttes – Possible Tailings Contamination*. October 19, 2001.

EPA, 2004a: *Letter Report – Valmont Butte Radiological Survey (DRAFT–rev.1).* November 4, 2004.

EPA, 2004b: *Evaluation of the Cover at the Valmont Butte Mill Site Boulder County, Colorado.* Prepared by Robert Duraski (EPA Region VIII Radiation Group). November 12, 2004.

EPA, 2005a: Memorandum Regarding *Analytical Results Report for Valmont Butte/Allied Piles, Boulder County, Colorado.* January 4, 2005.

EPA, 2005b: Letter from EPA to the City of Boulder Regarding *Recommended Next Steps at the Valmont Butte/Allied Piles Site, Boulder County, Colorado EPA ID: COD078348737.* February 24, 2005.

EPA, 2005c: Letter from EPA to the City of Boulder Department of Public Works Regarding *Review of the Draft Work Plan for the Valmont Butte/Allied Piles*. August 5, 2005.

Hendricks Milling Company, 1977: *Application for Radioactive Material License.* February 28, 1977.

Hendricks Milling Company, 1984a: Letter from Hendricks Milling Company to Hal Toland of the State Highway Department Regarding *Proposal to Provide 500,000 Cubic Yards of Dirt*. May 14, 1984.

Hendricks Milling Company, 1984b: Letter from Hendricks Milling Company to CDPHE Requesting Evidence that Radioactive Materials License 0329-01 is Currently Active. September 5, 1984.

Hendricks, Thomas, 2006: Video Recorded Interview with Mr. Hendricks for the Maria Rogers Oral History Program. July 20, 2006

Meier, Tom, 1994: *Time Bombs and Radiation, West Arapahoe and West Pearl.* Spring 1994.

M.J. Bright Minerals Development, Inc., 1980: Letter from M.J. Bright Minerals Development, Inc. to Mr. J.W. Lafollette of Tusco, Inc. Regarding *Radiation Survey*. May 16, 1980.

Scott, Glen R. and Cobban, William A., 1965: *Geologic and Biostratigraphic Map of the Pierre Shale Between Jarre Creek and Loveland, Colorado.* U.S. Geological Survey, Miscellaneous Geologic Investigations Map I-439.

S. M. Stoller Corporation, 2007, "*Final Report, Valmont Butte Hazardous and Industrial Waste Removal and Disposal.* Prepared for the City of Boulder. February 2, 2007.

Strategic Metals International, Inc., 1983: Letter from Strategic Metals International, Inc. to Boulder County Health Department. February 11, 1983.

Terracon, 2003: *Limited Intrusive Environmental Site Assessment, City of Boulder, Colorado Proposed Biosolids Dewatering and Composting Project, Boulder, Colorado.* July 11, 2003 (Revised September 30, 2003).

Terracon, 2004: *Limited Sampling and Analysis Report Hendricks Mining and Milling Site, Boulder County, Colorado.* December 6, 2004.

Terracon, 2005: *Draft Work Plan Valmont Butte/Allied Piles Site, 3000 North 63rd Street, Boulder, Colorado.* May 18, 2005.

Terracon, 2007: *Limited Impact Special Use Review Application, Tailings Ponds Cap Restoration Project, Valmont Butte/Allied Piles Site, 3000 North 63rd Street, Boulder, Colorado.* May 30, 2007.

Trimble, D. E., 1975: *Geologic Map of the Niwot Quadrangle, Boulder County, Colorado*. U.S. Geological Survey, Geologic Quadrangle Map, Map GQ-1129.

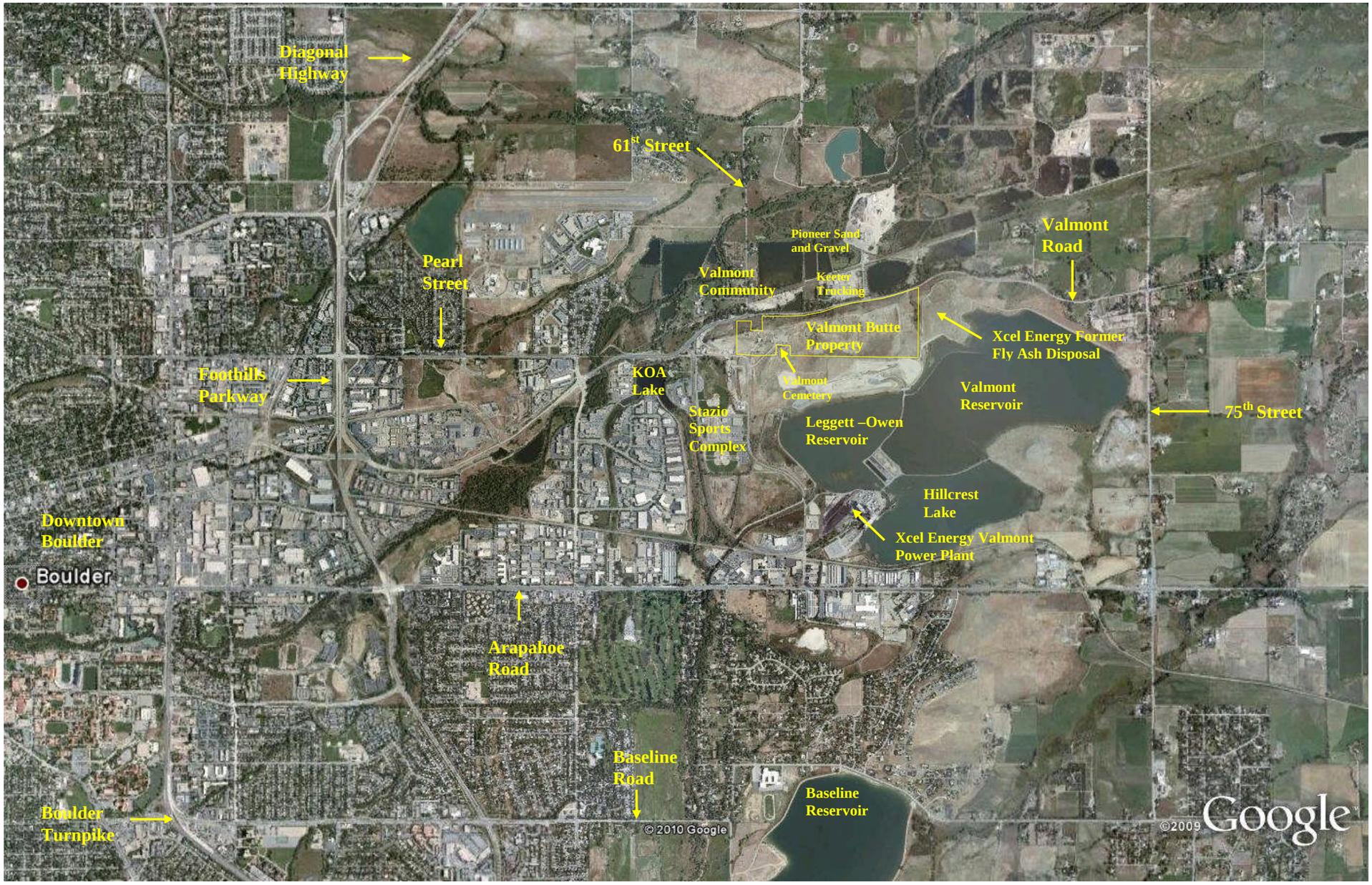
Tusco Incorporated (Tusco), 1986: Letter from Tusco to the BHD Discussing Proposed Plans to Reduce Fugitive Dust. March 15, 1986.

Tripp, Michael R., Callahan, William G. and Manik Hwang, editors, 1970: *Valmont Dike Natural Study Area.* Published by the Department of Geography, University of Colorado, Boulder, 1970:

URS Operating Services, Inc., 2005: *Analytical Results Report for Site Reassessment, Valmont Butte/Allied Piles, Boulder, Colorado.* Prepared for the U.S. Environmental Protection Agency. January 1, 2005.

Valmont Butte Corporation, 1996: *Valmont Butte Corporation Environmental Report for the State of Colorado Radiation Control Division, Allied Chemical Mill, 3000 N. 63rd Street, Boulder, CO 80301*. October 10, 1996.

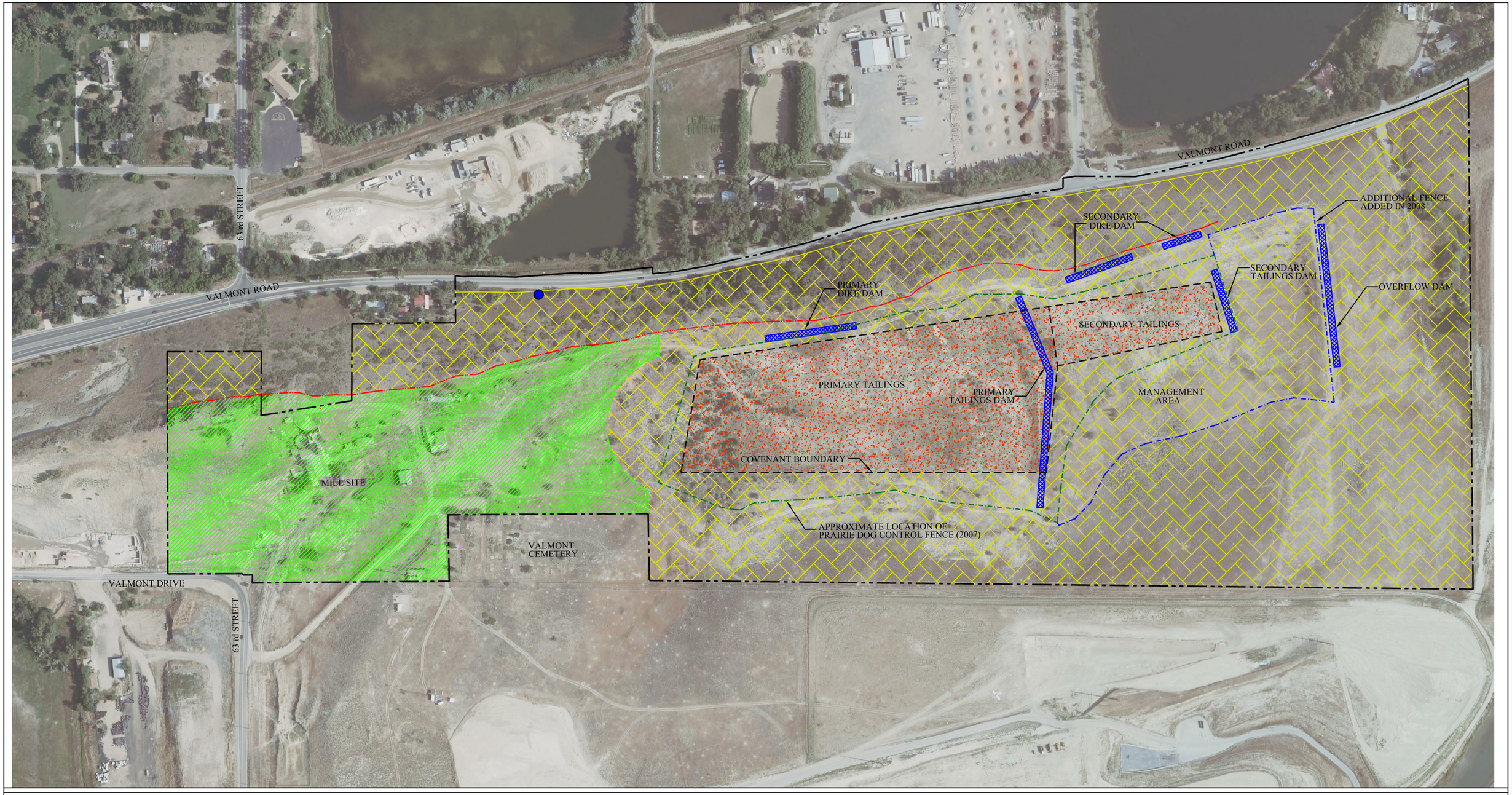
FIGURES



N

FIGURE 1

PROPERTY LOCATION AND VICINITY MAP
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO



CASEY RESOURCES, INC.

EXPLANATION

- Property Boundary
- Valmont Butte Ridge
- Outlying Vacant Area
- Mill Site Area
- Primary and Secondary Tailings (Covenant Controlled Area)
- Approximate Location of Former Water Supply Well

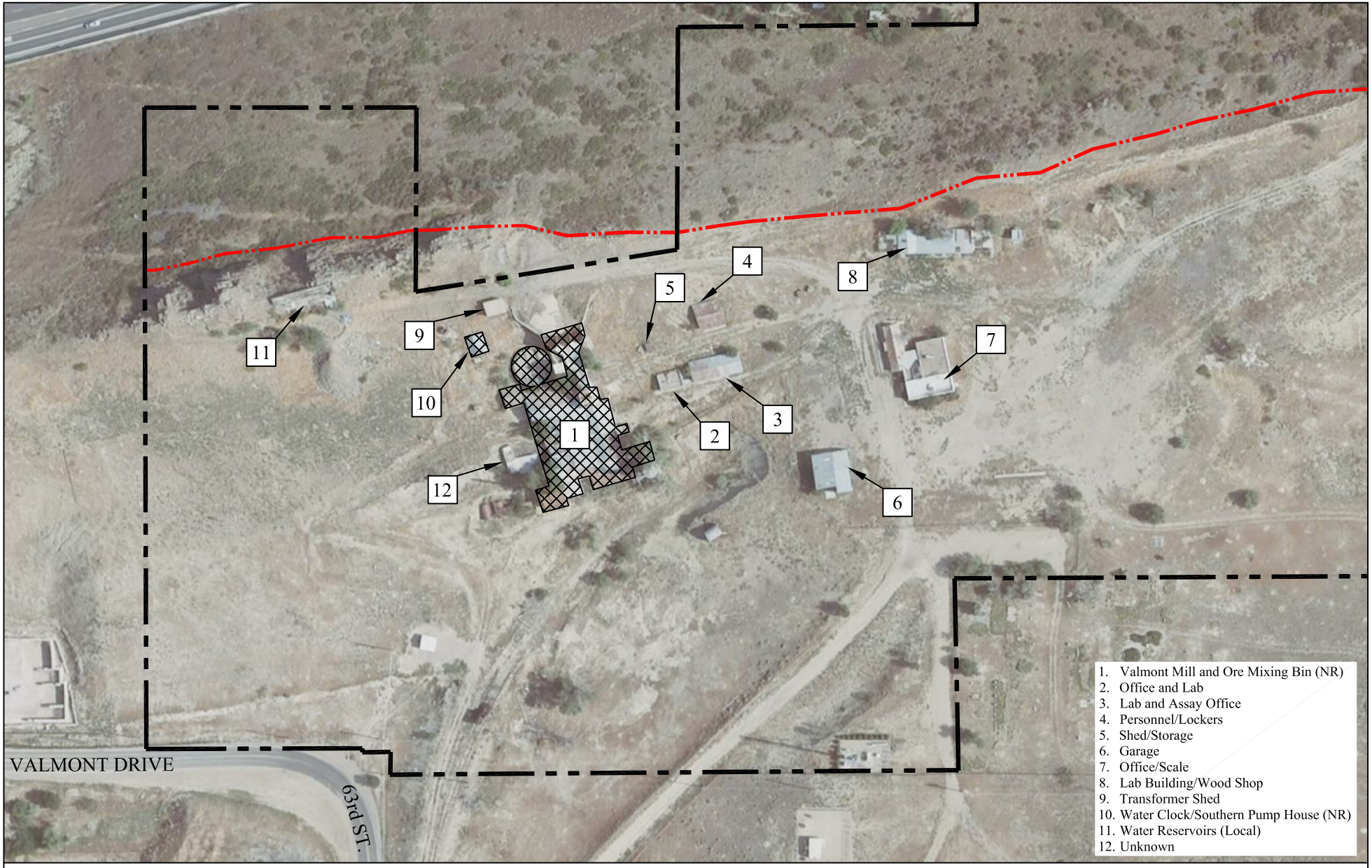
N

Scale: 1.0 Inch = 300'
Aerial Photograph from Google Earth

Valmont Butte Property Boundary based on April 14, 2000 Land Survey Plat

FIGURE 2

FACILITY MAP
VALMONT BUTTE PROPERTY
3000 NORTH 63rd STREET
BOULDER, COLORADO



CASEY RESOURCES, INC.

EXPLANATION

Property Boundary

Valmont Butte Ridge

Eligible for National Register as a Historic Building

Not Eligible

N

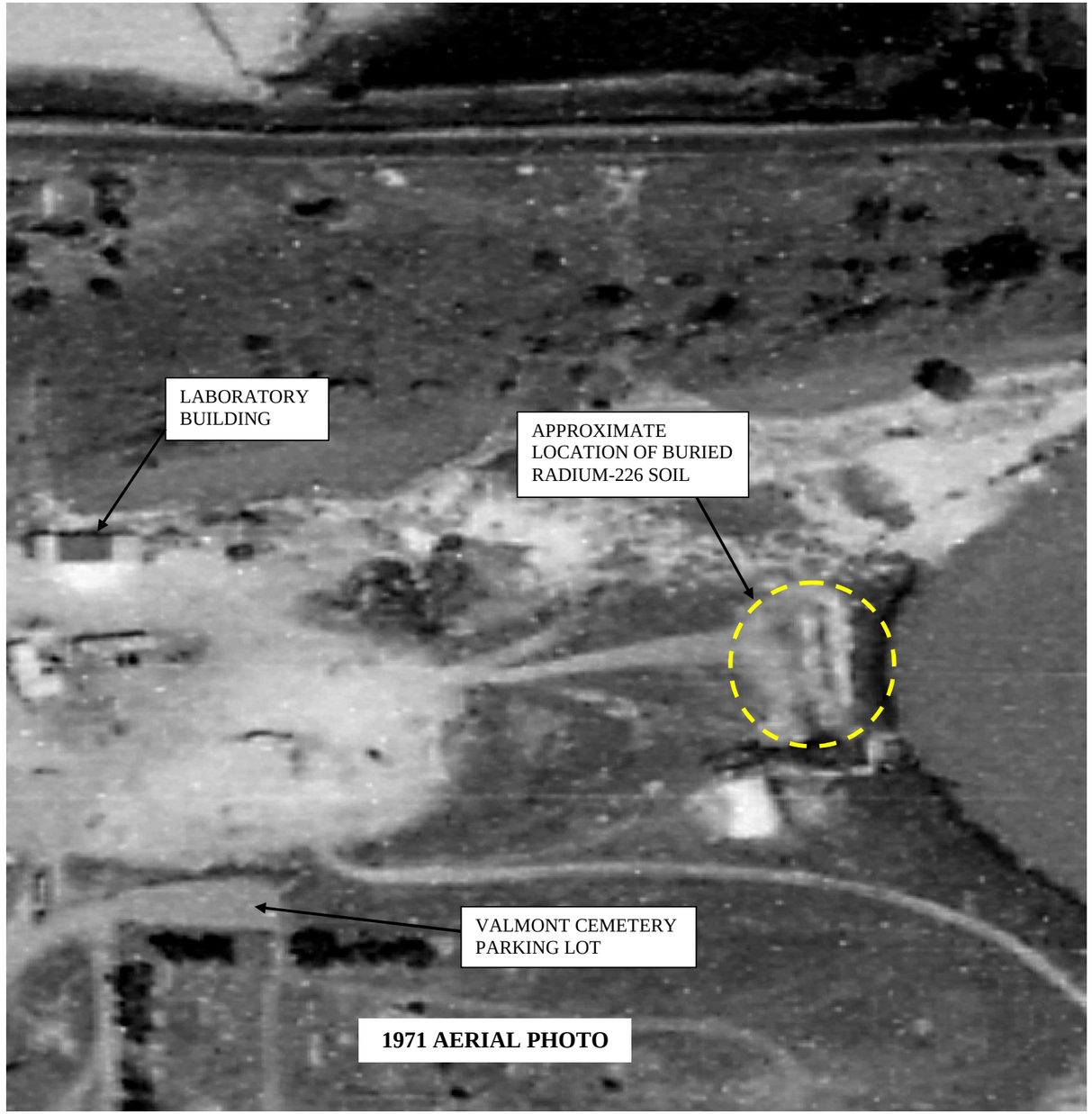
Scale: 1.0 Inch = 150'

Aerial Photograph from Google Earth

Valmont Butte Property Boundary based on April 14, 2000 Land Survey Plat

FIGURE 3

HISTORIC BUILDING ELIGIBILITY
VALMONT BUTTE PROPERTY
3000 NORTH 63rd STREET
BOULDER, COLORADO



CASEY RESOURCES, INC.

N

FIGURE 4

APPROXIMATE LOCATION OF BOULDER HOUSING AUTHORITY RADIUM-226 CONSTRUCTION DEBRIS DISPOSAL PIT
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO

EXPLANATION

Tailings Release Area

Source: 1966 Aerial Photograph provided by the City of Boulder.

N

FIGURE 5

TAILINGS MATERIAL RELEASE NORTH OF PRIMARY DIKE DAM VALMONT BUTTE PROPERTY 3000 NORTH 63RD STREET BOULDER, COLORADO

CASEY RESOURCES, INC.

EXPLANATION

- Property Boundary
- Covenant Boundary
- Prairie Dog Control Fence
- Valmont Butte Ridge
- A — Lead Concentration > 800 mg/Kg
- 1 — Location Of Elevated Radiation Readings (URS, 2005)

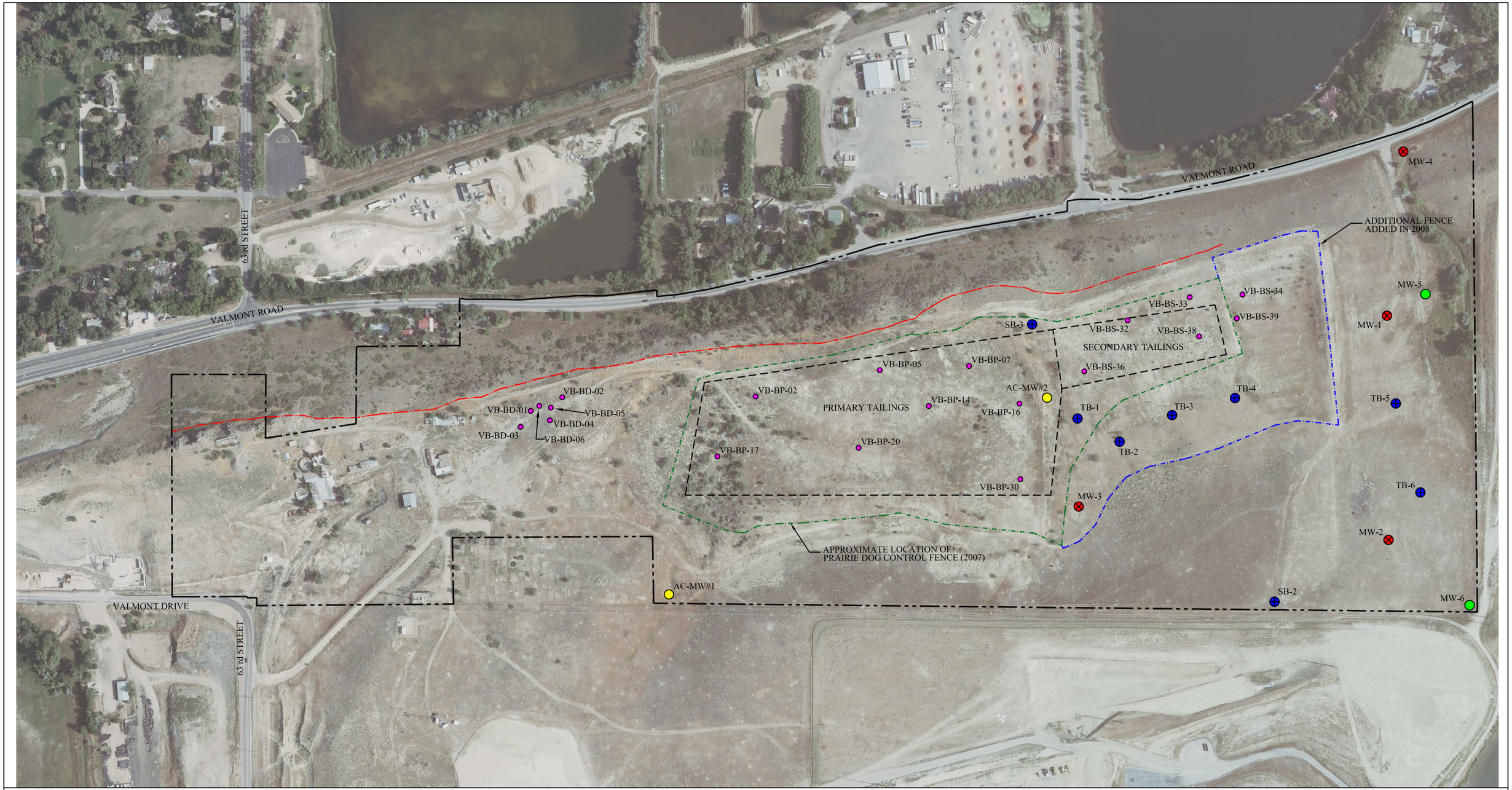
N

Scale: 1.0 Inch = 300'
Aerial Photograph from Google Earth

Valmont Butte Property Boundary based on
April 14, 2000 Land Survey Plat

FIGURE 6

MINING RESIDUAL MANAGEMENT AREAS
VALMONT BUTTE PROPERTY
3000 NORTH 63rd STREET
BOULDER, COLORADO



EXPLANATION

- Property Boundary
- Covenant Boundary
- Prairie Dog Control Fence
- Valmont Butte Ridge
- Ecology and Environment Soil Boring
- Terracon Soil Boring
- Terracon Monitoring Well
- Terracon Well as reported by URS (2005)
- URS (2005) Soil Borings

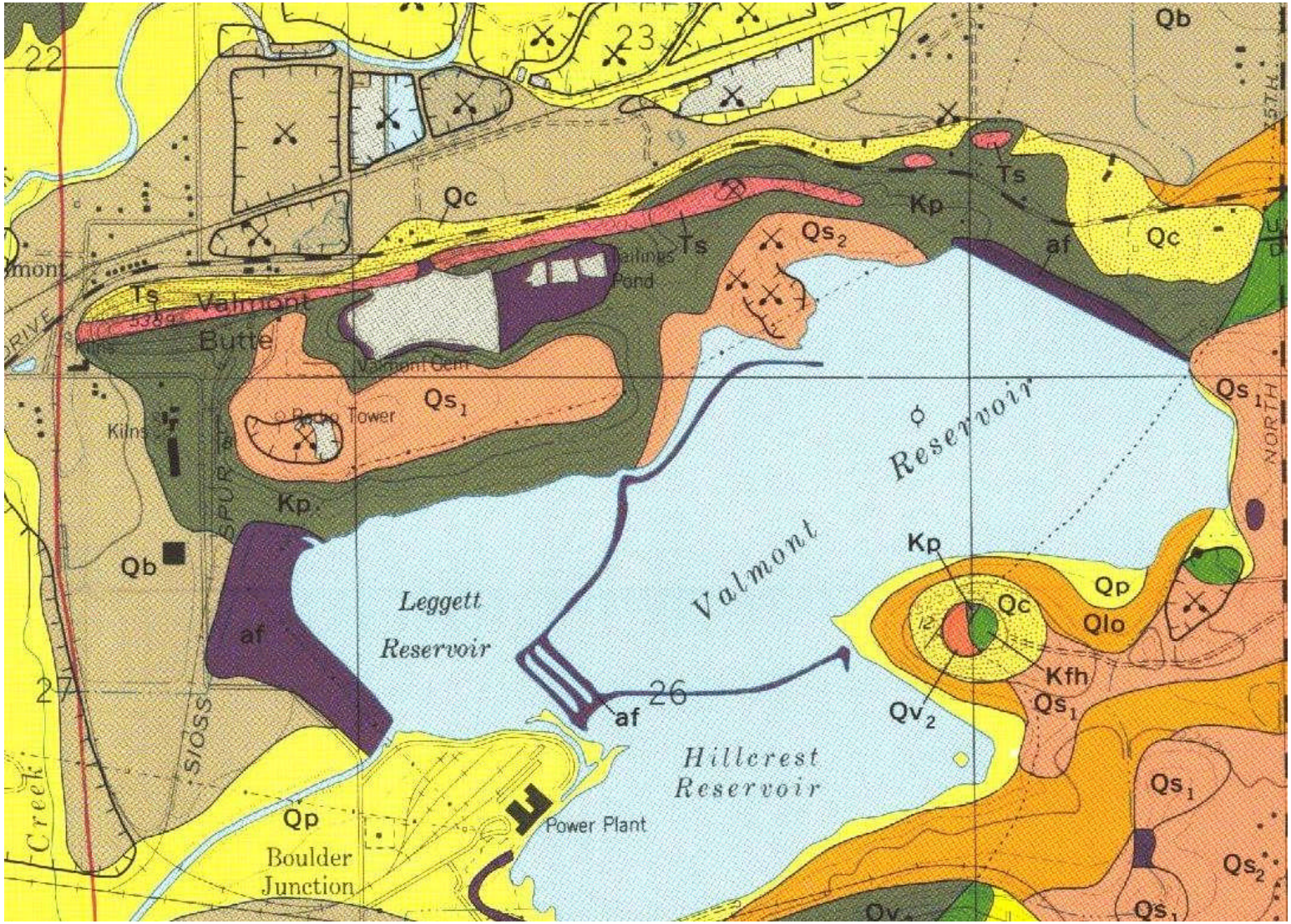
Scale: 1.0 Inch = 300'
Aerial Photograph from Google Earth

Valmont Butte Property Boundary based on April 14, 2000 Land Survey Plat

N

FIGURE 7

MONITORING WELL AND BOREHOLE LOCATION MAP
VALMONT BUTTE PROPERTY
3000 NORTH 63rd STREET
BOULDER, COLORADO



EXPLANATION

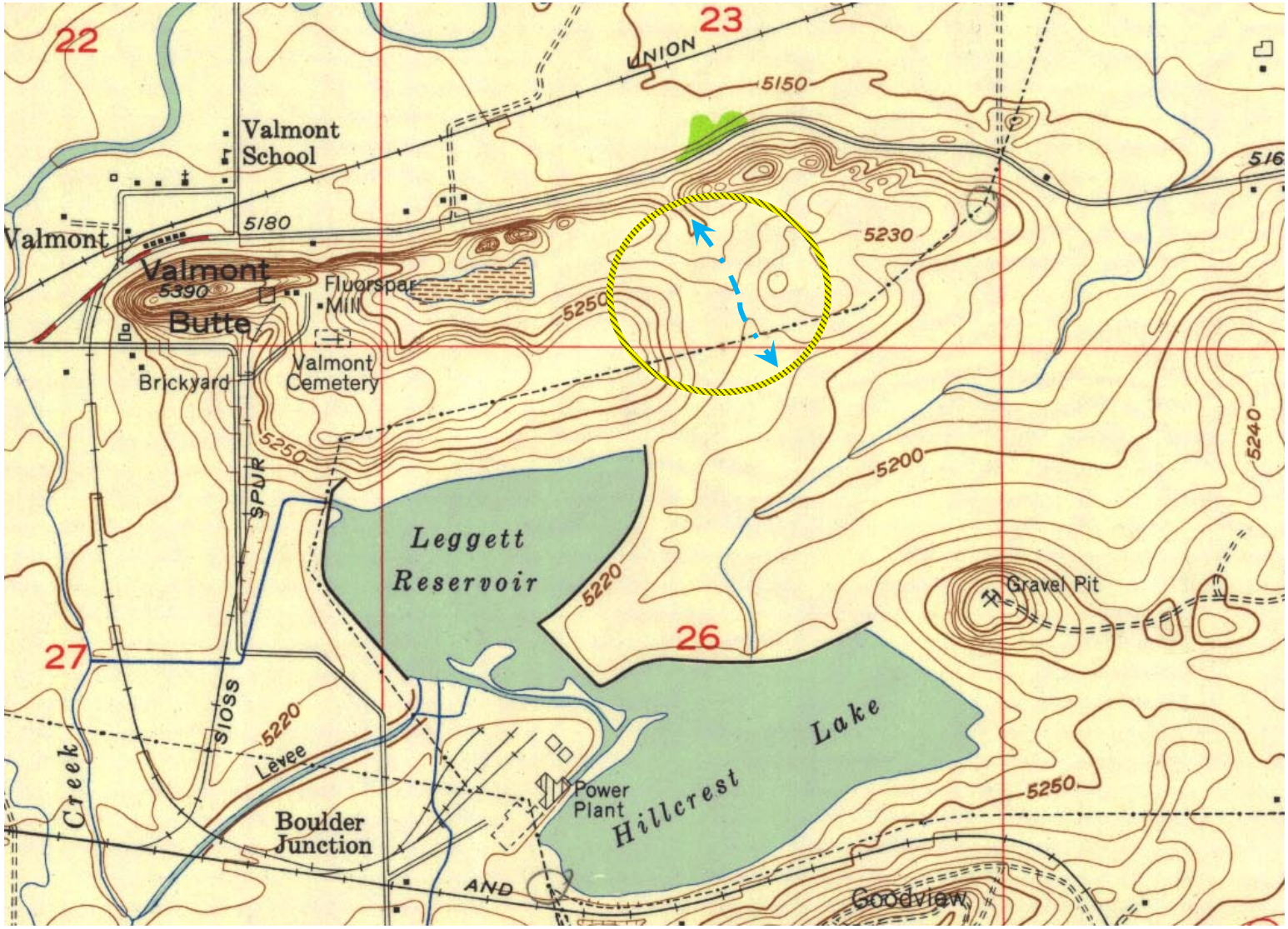
Qb - Broadway Alluvium
Qc - Colluvium
Qp - Piney Creek Alluvium
Qs - Slocum Alluvium
Ts - Shoshonite of the Valmont Dike
Kp - Pierre Shale
Kfh – Fox Hills Sandstone

Source: Geologic Map of the Niwot Quadrangle, Boulder County, Colorado, 1975

N

FIGURE 8

GEOLOGY MAP
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO



EXPLANATION

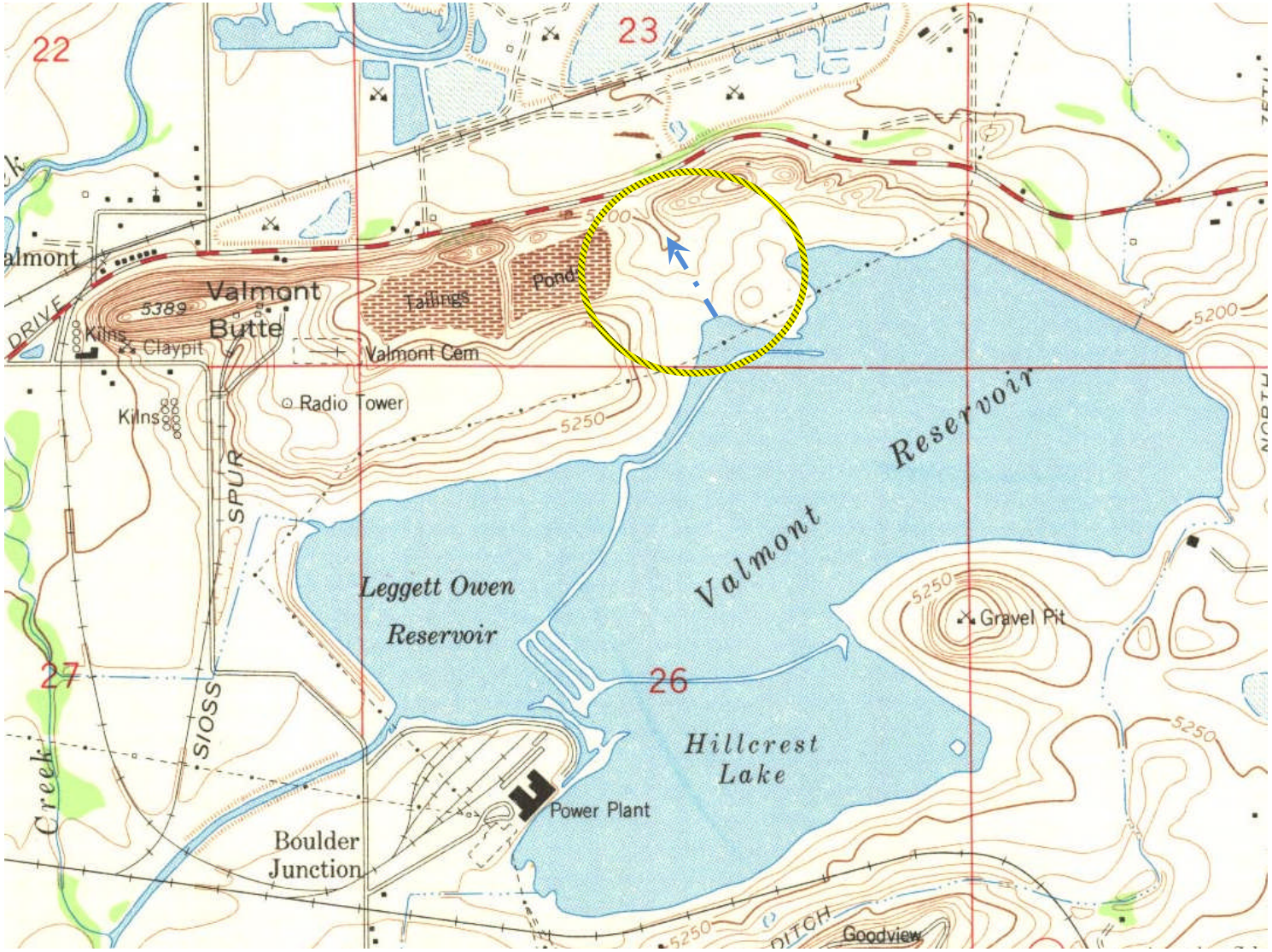
Drainage Divide Area

Source: U. S. Geological Survey, Niwot Topographic Map, 1950

N

FIGURE 9

DRAINAGE DIVIDE 1950
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO



EXPLANATION

Drainage Divide Area

Source: U. S. Geological Survey, Niwot Topographic Map, 1967

N

FIGURE 10

DRAINAGE DIVIDE 1967
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO

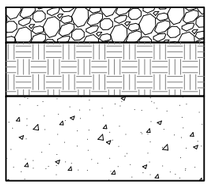
EXPLANATION

- PROPERTY LINE
- CURRENT COVENANT BOUNDARY
- PROJECTED CAP AREA
- PHYSICAL PONDING LIMITS
- LEAD CONCENTRATION > 800 MG/KG
- (2) KEYNOTE REFERENCE
- LOCATION OF ELEVATED RADIATION READINGS (URS,2005).

KEYNOTES

1. REMOVE MINING RESIDUALS/TAILINGS FROM SECONDARY POND TO PRIMARY TAILINGS POND.
2. REMOVE MINING RESIDUALS TO PRIMARY TAILING POND. ESTIMATED DEPTH OF EXCAVATION LESS THAN 2.0 FEET.
3. REMOVE MINING RESIDUALS TO PRIMARY TAILING POND. ESTIMATED DEPTH OF EXCAVATION GREATER THAN 2.0 FEET.
4. MINING RESIDUALS TO BE LEFT IN PLACE AND UNDISTURBED.
5. CONSOLIDATE, GRADE, AND CAP MINING RESIDUALS/TAILINGS ON PRIMARY TAILINGS POND PER TYPICAL CAP SECTION.
6. FILL BORROW AREA.
7. AREA OF NO DISTURBANCE.
8. WATER QUALITY FACILITY.

TYPICAL CAP SECTION



18" TYPE M RIPRAP (12" MEDIAN ROCK SIZE)

24" CLEAN FILL

MINING RESIDUALS/ TAILINGS MATERIAL

N

CRI CASEY RESOURCES, INC.

FIGURE 11

REMEDIATION PLAN

VALMONT BUTTE PROPERTY
3000 NORTH 63rd STREET
BOULDER, COLORADO

Scale: 1.0 Inch = 300'
Aerial Photograph from Google Earth

Valmont Butte Property Boundary based on April 14, 2000 Land Survey Plat

TABLES

TABLE 1

HISTORIC DRINKING WATER SAMPLE RESULTS
VALMONT BUTTE PROPERTY AREA
BOULDER, COLORADO

Location	Date Sampled	Radium 226 (pCi/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Uranium (pCi/L)	Fluoride (ppm)
CDPHE Standard (2009)		5.0	15.0	Not Established	*0.03 mg/L	4.0
6379 Valmont (Keeter Residence)	2/14/1967	0.81±0.18	**64.7±10.7**	NR	NR	NR
	10/1/1970	0.35±0.12	**37.7±19.9**	10.5±9.9	NR	1.1
	3/31/1971	0.13±0.10	**153.9±35.3**	17.7±12.8	NR	1.3
	9/7/1979	NR	2.6±3.9	3.9±8.0	0.4±0.7	NR
	6/27/1984	NR	**33.0±8.0**	1.8±4.0	**0.0544 mg/L**	0.83
	8/25/2004[a)]	ND (< 1)	ND (< 3)	ND (< 4)	ND (< 0.03 J) mg/L	0.82 J
	8/25/2004[b)]	NR	ND (< 1.1±0.7)	NR	0.001 mg/L	0.41
	8/31/2004 [b)]	NR	7.1±1.5	NR	4.5	0.67
6327 Valmont (Miller Residence)	10/1/1970	0.62±0.14	**34.8±22.0**	ND	NR	0.9
	3/31/1971	0.18±0.10	**101.0±31.5**	15.4±12.7	NR	0.8
	9/6/1979	NR	0.0±3.1	5.0±8.1	1.4±1.0	NR
	11/10/1981	NR	<8.0	<8.0	3.9±1.0	NR
	6/27/1984	NR	<8.0	<8.0	0.0051 mg/L	1.1
	8/25/2004[a]	ND (< 1)	ND (< 3)	2.14±2.18 J	ND (< 0.03 J) mg/L	0.53 J
6188 Valmont	9/24/1969	0.51±0.12	10.2±9.7	ND	NR	1.8
	10/1/1970	1.30±0.19	13.5±14.2	ND	NR	1.4
	3/31/1971	0.11±0.09	ND	ND	NR	1.4
	8/25/2004[a)]	ND (< 1	6.85±2.76	ND (< 4)	ND (< 0.03 J) mg/L	ND (< 1.0)
	8/25/2004[b)]	NR	5.6±2.4	NR	0.011 mg/L	1.1
6717 Valmont	2/14/1967	ND	ND	NR	NR	NR
	10/1/1970	**6.19±0.39**	**48.4±27.5**	14.3±11.4	NR	0.7
	3/31/1971	NR	**43.9±27.7**	ND	NR	0.7
	8/25/2004[a]	ND (< 1)	2.62±0.99 J	2.06±1.44 J	ND (< 0.03 J) mg/L	0.91 J
6903 Valmont	2/14/1967	ND	ND	NR	NR	NR
	10/1/1970	0.20±0.10	6.6±11.1	ND	NR	0.5
	8/25/2004[a]	ND (< 1)	2.53±0.982 J	ND (< 4)	ND (< 0.03 J) mg/L	0.59 J
5987 Valmont	10/1/1970	0.50±0.13	10.0±16.7	ND	NR	2.4
	3/31/1971	ND	ND	ND	NR	2.2
	8/25/2004[a)]	ND (< 1)	11.4±3.14	ND (< 4)	ND (< 0.03 J) mg/L	3.0
	8/25/2004[b)]	NR	8.4±2.2	NR	0.014 mg/L	1.4

pCi/L = Picocuries per liter ppm = Part per million mg/L = Milligrams per liter µg/L = Micrograms per liter
J = Estimated concentration ND = Not detected NR = Not reported * Measured as dissolved concentration
Source: Boulder County Department of Public Health, [a)] URS (2005), and [b)] Terracon (2004).
Bolded values indicate the concentration is greater than current Colorado groundwater standards.

TABLE 2

BEDROCK LITHOLOGY
VALMONT BUTTE PROPERTY
BOULDER, COLORADO

Boring #	Lithology [1)]			Groundwater [1)]	Screened Interval [1)]
	Lean Clay	Claystone	Shale		
MW-1	0.0 – 8.0	8.0 – 35.0	35.0 – 60.0	30	15 - 35
MW-2	0.0 – 3.0	3.0 – 39.0	39.0 - 100	Claystone moist to wet; shale moist	85 – 100
MW-3	0.0 – 6.0	6.0 – 34.0	34.0 – 100	Claystone moist to wet; shale moist	85 – 100
MW-4	0.0 – 19.0[2)]	Terminated (TD) at 19.0		12	4.0 – 19.0
SB-2	0.0 – 6.0	6.0 – 50.0	TD at 50.0	Claystone moist	Not Applicable
SB-3	0.0 – 8.0	8.0 – 27.0	27.0 – 50.0	Claystone/Shale moist	Not Applicable
TB-1	0.0 – 2.5	2.5 – 25.0	TD at 25.0	Claystone moist	Not Applicable
TB-2	0.0 – 5.0	5.0 – 40.0	40.0 – 45.0	37.5	Not Applicable
TB-3	0.0 – 3.0	3.0 – 15.0	TD at 15.0	Claystone moist	Not Applicable
TB-4	0.0 – 4.0	4.0 – 25.0	TD at 25.0	Claystone moist	Not Applicable
TB-5	0.0 – 6.0	6.0 – 20.0	TD at 20.0	Claystone moist	Not Applicable
TB-6	0.0 – 3.0	3.0 – 25.0	TD at 25.0	Claystone moist	Not Applicable

[1)] All measurements feet below ground surface.
[2)] The lean clay encountered in monitoring well MW-4 contained gravel and cobbles from 9.5 feet to 19 feet where auger refusal was encountered due to large cobbles.

Source: Terracon, 2003: *Limited Intrusive Environmental Site Assessment, City of Boulder, Colorado Proposed Biosolids Dewatering and Composting Project, Boulder, Colorado.* July 11, 2003 (Revised September 30, 2003).

TABLE 3

ESTIMATED VOLUME OF MINING RESIDUALS REQUIRING LONG TERM MANAGEMENT VALMONT BUTTE PROPERTY BOULDER, COLORADO

Mining Residual Area	Estimated Surface Area (Square Feet)	Estimated Maximum Depth of Mining Residuals (Feet Below Ground Surface)	Estimated Volume of Mining Residuals Requiring Long Term Management (Cubic Yards)
Secondary Tailings[1)]	270,000	7.0	70,000
Mill Building	2,500	4.0	370
Area "A"	1,500	0.5	28
Area "B"	2,500	0.5	46
Area "C"	71,000	4.0	10,518
Area "D"	6,700	1.5	372
Area "E"	5,600	4.0	830
Area "F"	2,100	1.0	78
Area "G"	1,300	4.0	193
Area "I"	1,300	0.5	24
Area "J"	5,100	1.0	189
Area "AA"	60,000	1.5	3,333
Area "BB"[2)]	63,400	0.5	1,174
Area "CC"	10,000	0.5	185
		TOTAL VOLUME	**87,340**

[1)] Secondary tailings volume and average depth of impact obtained from URS (2005) report.
[2)] The culturally sensitive area associated with Area BB is not included in the volume estimate.

See Figures 6 and 11 for location of mining residual areas.

APPENDIX A

HIGH-DENSITY COMPACT DISK

ELECTRONIC COPIES OF REFERENCED MATERIALS

KEY FOR REFERENCE MATERIALS CONTAINED ON THE ATTACHED CD

1. Acclaim Environmental Services, Inc. (Acclaim), 2001: *Asbestos Abatement, Valmont Butte Site Mill Building, 3000 North 63rd Street, Boulder, Colorado.* August 7, 2001

2. Alisto Engineering Group, 2000: *Phase I Environmental Site Assessment of the Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado*. September 18, 2000.

3. Allied Chemical Corporation, 1971: *Application for Radioactive Material License.* August 3, 1971.

4. Allied Chemical Corporation, 1975: Letter from Allied Chemical Corporation to CDPHE Regarding *Letter of Aug. 15, 1975.* August 22, 1975.

5. Boulder City-County Health Department currently Boulder County Department of Public Health (BHD), 1972: Memorandum from BHD to Colorado Department of Health Regarding *Allied Chemical Co. – Valmont Mill Status Report and Summary*. October 24, 1972.

6. BHD, 1973a: *Special Environmental Health Report*. March 8, 1973.

7. BHD, 1973b: Letter from BHD to Boulder Department of Development Regarding *Allied Chemical Installation at 63rd and Valmont Drive*. September 12, 1973.

8. BHD, 1975: *Special Environmental Health Report*. April 30, 1975.

9. BHD, 1976: *Special Environmental Health Report*. November 1, 1976.

10. BHD, 1977: *Water Supply Inspection Report.* November 9, 1977.

11. BHD, 1982: *µR Meter Survey of Hendricks Milling Site Formerly Allied Chemical – Settling Ponds*. September 14, 1982.

12. BHD, 1985a: *Special Environmental Health Report*. April 11, 1985.

13. BHD, 1985b: *Special Environmental Health Report*. November 7, 1985.

14. BHD, 1986: Letter from BHD to Tusco Corporation Regarding *Boulder Milling Company Tailing Pond*. March 28, 1986.

15. City of Boulder, 2002: *Memorandum of Understanding*. August 17, 2002.

16. City of Boulder, 2007a: City of Boulder Memorandum Regarding *Study Session – January 30, 2007 Update on Disposition of Valmont Butte Property and Associated Issues*. January 19, 2007.

17. City of Boulder, 2007b: Letter from the City of Boulder City Manager to Rocky Mountain Peace and Justice Center Regarding *Concerns About the Valmont Butte Site*. December 21, 2007.

18. City of Boulder, 2008: Letter from the City of Boulder Public Works to CDPHE Regarding "*Proposed Actions Schedule Extension Request*". January 16, 2008.

19. City of Boulder, 2009: *City of Boulder's Response United States Environmental Protection Agency, Region8 Request for Information Hendricks Mining and Milling/Valmont Butte Site – Boulder, Colorado*. December 18, 2009.

20. City of Boulder web page: http://www.bouldercolorado.gov/

21. Colorado Department of Health currently the Colorado Department of Public Health and Environment (CDPHE), 1966a: *Colorado State Department of Public Health Division of Sanitation Industrial Wastes Lab Report.* Sample collected January 28, 1966.

22. CDPHE, 1966b: *Colorado State Department of Public Health Division of Sanitation Industrial Wastes Inventory.* November 22, 1966

23. CDPHE, 1967: Letter from CDPHE to General Chemical Plant Discussing Sampling Event Conducted on February 14, 1967. March 31, 1967.

24. CDPHE, 1969: Letter from CDPHE to Allied Chemical Corporation Discussing Data Omitted From Letter Dated September 24, 1969. October 2, 1969.

25. CDPHE, 1970: Letter from CDPHE to Allied Chemical Corporation Discussing Sampling Event Conducted on October 1, 1970. November 10, 1970.

26. CDPHE, 1971a: Letter from CDPHE to Allied Chemical Corporation Discussing Sampling Event Conducted on March 31, 1971. July 12, 1971.

27. CDPHE, 1971b: *Radioactive Materials License (Colo. 117-01) for Allied Chemical Corporation.* August 17, 1971.

28. CDPHE, 1971c: *Radioactive Materials License (Colo. 117-01) – Amendment No. 1*. October 22, 1971.

29. CDPHE, 1971d: *Radioactive Materials License (Colo. 117-01) – Amendment No. 2*. December 6, 1971.

30. CDPHE, 1972: *Industrial Waste Water Facility Inspection Sheet.* August 17, 1972.

31. CDPHE, 1977: *Radioactive Materials License (Colo. 329-01 for Hendricks Mining Company)*. April 4, 1977.

32. CDPHE, 1979: *Water Quality Data, B-1 Miller Residence/B-2 Keeter Residence.* September 6, 1979.

33. CDPHE, 1980: Inter-Office Communication: *Financial Surety Aspects November 27, 1979; December 11, 1979.* February 3, 1980.

34. CDPHE, 1981: *Chemical Analysis Drinking Water, Miller Residence.* November 10, 1981.

35. CDPHE, 1983a: Letter from CDPHE to Hendricks Milling Regarding *Addition of Other Material to the Valmont Pond Colorado Radioactive Materials License #274-01S.* February 15, 1983.

36. CDPHE, 1983b: Letter from CDPHE to Hendricks Milling Regarding *Our February 15, 1983 Authorization to Receive Waste Material from Strategic Metals International*. April 19, 1983.

37. CDPHE, 1984a: Letter from CDPHE to EPA Regarding *Hendricks's Radioactive Fluorspar Tailings Pile.* June 12, 1984.

38. CDPHE, 1984b: CDPHE Inter-Office Communication Regarding *Valmont Roadside Clean-up.* June 14, 1984.

39. CDPHE, 1984c: Letter from CDPHE to Hendricks Milling Company Regarding *Your Letter to Hal Toland (i.e. State Highway Department).* June 14, 1984.

40. CDPHE, 1984d: *Water Quality Data, Miller Residence/Keeter Residence.* June 27, 1984.

41. CDPHE, 1984e: Letter from CDPHE to Hendricks Milling Company Regarding *Your Letters of June 14 and 21, 1984.* July 19, 1984.

42. CDPHE, 1988: Letter from CDPHE to Hendricks Mining Co. Inc. Discussing Colorado Solid Waste Regulations, EPA Investigations, and Radioactive Materials License. February 18, 1988.

43. CDPHE, 1995: Letter from CDPHE to Valmont Butte Corporation Discussing Review of the Radiation Control Division Files with Respect to Radioactive Materials License. June 1, 1995.

44. CDPHE, 1999a: *Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division, Uranium and Special Projects Unit, Technical Evaluation of Surface Gamma Radiation Survey, Valmont Butte Corporation Site, Boulder, Colorado*. July 27, 1999.

45. CDPHE, 1999b: *Decision Analysis: Assurance of Equivalent Protection to Public Health and Environment in the Absence of a Colorado Radioactive Materials License, for Valmont Butte Site, Valmont Butte Corporation, Boulder, Colorado*. October 6, 1999.

46. CDPHE, 1999c: *Agreement and Declaration of Covenants*. October 12, 1999.

47. CDPHE, 2004: *First Amendment to the Agreement and Declaration of Covenants for the Valmont Butte Property dated October 12, 1999*. August 2004.

48. CDPHE, 2007: *Table 1 Colorado Soil Evaluation Values (CSEV)*. December 2007.

49. Casey Resources, Inc. (CRI), 2009a: *Revised Work Plan - Identification and Confirmation of Soils Requiring Long Term Management*. May 13, 2009.

50. CRI, 2009b: *Identification and Confirmation of Soils Requiring Long Term Management, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado*. November 24, 2009.

51. Ecology and Environment Inc. (E&E), 1984: Memorandum Regarding *Reconnaissance Visit to Hendricks' Mill, Boulder, Colorado (TDD R8-8408-18)*. December 31, 1984.

52. E&E, 1985: *Sampling Activities Report for Allied Chemical Tailings Pond, Boulder, Colorado*. March 25, 1985.

53. Environmental Protection Agency (EPA), 1984: Memorandum Regarding *Tailings Pond Reclamation*. June 5, 1984.

54. EPA, 1985a: Memorandum Regarding *Field Investigation at Former Allied Chemical Company Mill*. February 25, 1985.

55. EPA, 1985b: Letter from EPA to Mr. J.W. LaFollette Regarding *Radioactivity of Fluorspar Tailings*. March 6, 1985.

56. EPA, 1985c: Memorandum Regarding *Partial Radioactivity Results/Allied Chemical*. March 8, 1985.

57. EPA, 2001: E-Mail Correspondence Regarding *Valmont Buttes – Possible Tailings Contamination*. October 19, 2001.

58. EPA, 2004a: *Letter Report – Valmont Butte Radiological Survey (DRAFT–rev.1)*. November 4, 2004.

59. EPA, 2004b: *Evaluation of the Cover at the Valmont Butte Mill Site Boulder County, Colorado*. Prepared by Robert Duraski (EPA Region VIII Radiation Group). November 12, 2004.

60. EPA, 2005a: Memorandum Regarding *Analytical Results Report for Valmont Butte/Allied Piles, Boulder County, Colorado.* January 4, 2005.

61. EPA, 2005b: Letter from EPA to the City of Boulder Regarding *Recommended Next Steps at the Valmont Butte/Allied Piles Site, Boulder County, Colorado EPA ID: COD078348737*. February 24, 2005.

62. EPA, 2005c: Letter from EPA to the City of Boulder Department of Public Works Regarding *Review of the Draft Work Plan for the Valmont Butte/Allied Piles*. August 5, 2005.

63. Hendricks Milling Company, 1977: *Application for Radioactive Material License.* February 28, 1977.

64. Hendricks Milling Company, 1984a: Letter from Hendricks Milling Company to Hal Toland of the State Highway Department Regarding *Proposal to Provide 500,000 Cubic Yards of Dirt*. May 14, 1984.

65. Hendricks Milling Company, 1984b: Letter from Hendricks Milling Company to CDPHE Requesting Evidence that Radioactive Materials License 0329-01 is Currently Active. September 5, 1984.

66. Hendricks, Thomas, 2006: Video Recorded Interview with Mr. Hendricks for the Maria Rogers Oral History Program. July 20, 2006

67. Meier, Tom, 1994: *Time Bombs and Radiation, West Arapahoe and West Pearl.* Spring 1994.

68. M.J. Bright Minerals Development, Inc., 1980: Letter from M.J. Bright Minerals Development, Inc. to Mr. J.W. Lafollette of Tusco, Inc. Regarding *Radiation Survey*. May 16, 1980.

69. Scott, Glen R. and Cobban, William A., 1965: *Geologic and Biostratigraphic Map of the Pierre Shale Between Jarre Creek and Loveland, Colorado.* U.S. Geological Survey, Miscellaneous Geologic Investigations Map I-439. [1)]

70. S. M. Stoller Corporation, 2007, "*Final Report, Valmont Butte Hazardous and Industrial Waste Removal and Disposal.* Prepared for the City of Boulder. February 2, 2007.

71. Strategic Metals International, Inc., 1983: Letter from Strategic Metals International, Inc. to Boulder County Health Department. February 11, 1983.

[1)] This map is not included on the CD, but can be purchased from the U.S. Geological Survey.

72. Terracon, 2003: *Limited Intrusive Environmental Site Assessment, City of Boulder, Colorado Proposed Biosolids Dewatering and Composting Project, Boulder, Colorado.* July 11, 2003 (Revised September 30, 2003).

73. Terracon, 2004: *Limited Sampling and Analysis Report Hendricks Mining and Milling Site, Boulder County, Colorado.* December 6, 2004.

74. Terracon, 2005: *Draft Work Plan Valmont Butte/Allied Piles Site, 3000 North 63rd Street, Boulder, Colorado.* May 18, 2005.

75. Terracon, 2007: *Limited Impact Special Use Review Application, Tailings Ponds Cap Restoration Project, Valmont Butte/Allied Piles Site, 3000 North 63rd Street, Boulder, Colorado.* May 30, 2007.

76. Trimble, D. E., 1975: *Geologic Map of the Niwot Quadrangle, Boulder County, Colorado*. U.S. Geological Survey, Geologic Quadrangle Map, Map GQ-1129. [2)]

77. Tripp, Michael R., Callahan, William G. and Manik Hwang, editors, 1970: *Valmont Dike Natural Study Area.* Published by the Department of Geography, University of Colorado, Boulder, 1970.

78. Tusco Incorporated (Tusco), 1986: Letter from Tusco to the BHD Discussing Proposed Plans to Reduce Fugitive Dust. March 15, 1986.

79. URS Operating Services, Inc., 2005: *Analytical Results Report for Site Reassessment, Valmont Butte/Allied Piles, Boulder, Colorado.* Prepared for the U.S. Environmental Protection Agency. January 1, 2005.

80. Valmont Butte Corporation, 1996: *Valmont Butte Corporation Environmental Report for the State of Colorado Radiation Control Division, Allied Chemical Mill, 3000 N. 63rd Street, Boulder, CO 80301*. October 10, 1996.

[2)] This map is not included on the CD, but can be purchased from the U.S. Geological Survey.

APPENDIX B

LAND SURVEY PLAT

LAND SURVEY PLAT

A PART OF THE S 1/2 OF THE SE 1/4 OF SECTION 22 AND THE SW 1/4 OF SECTION 23, TOWNSHIP 1 NORTH, RANGE 70 WEST OF THE 6TH P.M., COUNTY OF BOULDER, STATE OF COLORADO

LEGAL DESCRIPTION: PER SURVEY:

A PART OF THE SOUTH 1/2 OF THE SOUTHEAST 1/4 OF SECTION SECTION 22 AND THE SOUTHWEST 1/4 OF SECTION 23, TOWNSHIP 1 NORTH, RANGE 70 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF BOULDER, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF SAID SECTION 22;
THENCE N00°42'59"W ALONG THE EAST LINE OF SAID SECTION 22, A DISTANCE OF 214.50 FEET TO THE NORTHEAST CORNER OF A TRACT OF LAND DESCRIBED IN DEED RECORDED IN THE BOULDER COUNTY CLERK AND RECORDER'S OFFICE AT RECEPTION NO. 776011;
THENCE S89°50'33"W ALONG THE NORTHERLY LINE OF SAID TRACT, A DISTANCE OF 627.00 FEET;
THENCE S00°42'59"E ALONG THE WESTERLY LINE OF SAID TRACT, A DISTANCE OF 214.50 FEET TO THE SOUTH LINE OF SAID SECTION 22;
THENCE S89°50'33"W ALONG SAID SOUTH LINE, A DISTANCE OF 652.00 FEET;
THENCE N00°09'27"W, A DISTANCE OF 26.00 FEET;
THENCE S89°50'33"W, A DISTANCE OF 31.76 FEET TO THE EASTERLY RIGHT-OF-WAY LINE OF VALMONT ROAD DESCRIBED IN DEED RECORDED IN SAID BOULDER COUNTY CLERK AND RECORDER'S OFFICE IN BOOK 92 AT PAGE 83;
THENCE N00°34'38"W ALONG SAID EASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 4.00 FEET;
THENCE S89°50'33"W ALONG THE NORTHERLY RIGHT-OF-WAY LINE OF SAID VALMONT ROAD, A DISTANCE OF 272.24 FEET;
THENCE N00°32'13"W, A DISTANCE OF 715.70 FEET;
THENCE N89°55'51"E, A DISTANCE OF 303.98 FEET;
THENCE S00°15'30"E, A DISTANCE OF 207.57 FEET;
THENCE N80°54'53"E, A DISTANCE OF 295.90 FEET;
THENCE N00°10'05"W, A DISTANCE OF 395.79 FEET MORE OR LESS TO THE SOUTHERLY BANK OF THE HOUSEL MILL DITCH AS LOCATED BY FIELD SURVEY;
THENCE ALONG SAID SOUTHERLY BANK OF THE HOUSEL MILL DITCH THE FOLLOWING NINE (9) COURSES:
1) THENCE N86°31'26"E, A DISTANCE OF 94.51 FEET;
2) THENCE N85°41'24"E, A DISTANCE OF 79.99 FEET;
3) THENCE N88°12'02"E, A DISTANCE OF 119.79 FEET;
4) THENCE S83°51'50"E, A DISTANCE OF 79.00 FEET;
5) THENCE N89°58'58"E, A DISTANCE OF 79.76 FEET;
6) THENCE S88°13'49"E, A DISTANCE OF 88.86 FEET;
7) THENCE N86°12'29"E, A DISTANCE OF 181.49 FEET;
8) THENCE N89°46'43"E, A DISTANCE OF 89.40 FEET;
9) THENCE N84°11'03"E, A DISTANCE OF 170.69 FEET MORE OR LESS TO THE EAST LINE OF THE SOUTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SECTION 22;
THENCE S00°42'59"E ALONG SAID EAST LINE OF SECTION 22, A DISTANCE OF 22.03 FEET TO THE CENTERLINE OF VALMONT DRIVE (COUNTY ROAD NO. 52) PRIOR TO 1984 PER BOULDER COUNTY ROADWAY PROJECT RD-052-020;
THENCE ALONG SAID CENTERLINE OF VALMONT DRIVE THE FOLLOWING SIX (6) COURSES;
1) THENCE ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 1949.42 FEET AND A CENTRAL ANGLE OF 06°25'34", AN ARC DISTANCE OF 218.64 FEET (CHORD BEARS N81°20'32"E, 218.52 FEET);
2) THENCE N78°07'45"E, A DISTANCE OF 229.14 FEET;
3) THENCE ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 1502.81 FEET AND A CENTRAL ANGLE OF 05°20'00", AN ARC DISTANCE OF 139.89 FEET (CHORD BEARS N75°27'45"E, 139.84 FEET);
4) THENCE N72°47'45"E, A DISTANCE OF 174.81';
5) THENCE ALONG THE ARC OF A CURVE TO THE RIGHT HAVING A RADIUS OF 1549.30 FEET AND A CENTRAL ANGLE OF 08°07'20", AN ARC DISTANCE OF 219.63 FEET (CHORD BEARS N76°51'36"E, 219.43 FEET);
6) THENCE N80°55'05"E, A DISTANCE OF 362.55 FEET MORE OR LESS TO THE WEST LINE OF THE SOUTHEAST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 23;
THENCE N 00°32'38"W ALONG SAID WEST LINE OF THE SOUTHEAST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 23, A DISTANCE OF 33.37 FEET TO THE NORTHERLY RIGHT-OF-WAY LINE OF SAID VALMONT DRIVE (COUNTY ROAD NO. 52);
THENCE N80°55'05"E ALONG SAID NORTHERLY RIGHT-OF-WAY, A DISTANCE OF 38.06 FEET TO THE NORTH LINE OF SAID SOUTHEAST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 23;
THENCE S89°34'18"E ALONG THE SAID NORTH LINE, A DISTANCE OF 195.05 FEET TO SAID CENTERLINE OF VALMONT DRIVE PRIOR TO 1984;
THENCE ALONG SAID CENTERLINE OF VALMONT DRIVE THE FOLLOWING THREE (3) COURSES;
1) THENCE N77°54'00"E, A DISTANCE OF 283.58 FEET;
2) THENCE N74°52'36"E, A DISTANCE OF 506.63 FEET;
3) THENCE ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 1557.16 FEET AND A CENTRAL ANGLE OF 12°32'59", AN ARC DISTANCE OF 341.07 FEET (CHORD BEARS N68°36'26"E, 340.39 FEET) MORE OR LESS TO THE EAST LINE OF THE SOUTHWEST 1/4 OF SECTION 23;
THENCE S00°22'06"E ALONG SAID EAST LINE OF THE SOUTHWEST 1/4 OF SECTION 23, A DISTANCE OF 1644.17 FEET TO THE SOUTH 1/4 CORNER OF SECTION 23;
THENCE N89°23'30"W ALONG THE SOUTH LINE OF SAID SOUTHWEST 1/4 OF SECTION 23, A DISTANCE OF 2628.30 FEET TO THE TRUE POINT OF BEGINNING.

EXCEPT A PARCEL OF LAND DESCRIBED IN DEED RECORDED IN SAID BOULDER COUNTY CLERK AND RECORDER'S OFFICE AT RECEPTION NO. 129929, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF THE SOUTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SECTION 22; THENCE S00°34'38"E ALONG THE WEST LINE OF SAID SOUTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SECTION 22, A DISTANCE OF 346.50 FEET; THENCE N89°25'22"E, A DISTANCE OF 330.00 FEET TO THE TRUE POINT OF BEGINNING, BEING THE NORTHWEST CORNER OF SAID PARCEL OF LAND DESCRIBED IN DEED RECORDED IN THE BOULDER COUNTY CLERK AND RECORDER'S OFFICE AT RECEPTION NO. 129929;
THENCE THE FOLLOWING FOUR (4) COURSES:
1) THENCE S00°34'38"E, A DISTANCE OF 132.00 FEET;
2) THENCE N89°25'22"E, A DISTANCE OF 330.00 FEET;
3) THENCE N00°34'38"W, A DISTANCE OF 132.00 FEET;
4) THENCE S89°25'22"W, A DISTANCE OF 330.00 FEET TO THE TRUE POINT OF BEGINNING CONTAINING 1.00 ACRES, MORE OR LESS.

EXCEPT A PARCEL OF LAND DESCRIBED IN DEED RECORDED IN THE BOULDER COUNTY CLERK AND RECORDER'S OFFICE AT RECEPTION NO. 622620, DESCRIBED AS FOLLOWS:

COMMENCING AT THE CENTER 1/4 CORNER OF SECTION 23; THENCE S00°22'06"E ALONG THE EAST LINE OF THE SOUTHWEST 1/4 OF SECTION 23, A DISTANCE OF 1033.39 FEET TO THE TRUE POINT OF BEGINNING, BEING THE NORTHEASTERLY CORNER OF SAID PARCEL OF LAND DESCRIBED IN DEED RECORDED IN THE BOULDER COUNTY CLERK AND RECORDER'S OFFICE AT RECEPTION NO. 622620;
THENCE THE FOLLOWING TWENTY (20) COURSES:
1) THENCE S00°22'06"E CONTINUING ALONG SAID EAST LINE A DISTANCE OF 11.56 FEET;
2) THENCE ALONG THE ARC OF A CURVE TO THE RIGHT HAVING A RADIUS OF 2586.48 FEET AND A CENTRAL ANGLE OF 16°52'15", AN ARC DISTANCE OF 761.59 FEET (CHORD BEARS S71°23'20"E, 758.84 FEET);
3) THENCE S79°49'27"W, A DISTANCE OF 832.33 FEET;
4) THENCE ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 5689.58 FEET AND A CENTRAL ANGLE OF 03°50'57", AN ARC DISTANCE OF 382.23 FEET (CHORD BEARS S77°53'58"W, 382.16 FEET);
5) THENCE S75°58'30"W, A DISTANCE OF 379.85 FEET;
6) THENCE ALONG THE ARC OF A CURVE TO THE RIGHT HAVING A RADIUS OF 2904.80 FEET AND A CENTRAL ANGLE OF 14°57'18", AN ARC DISTANCE OF 758.19 FEET (CHORD BEARS S83°27'09"W, 756.04 FEET);
7) THENCE N89°04'12"W, A DISTANCE OF 213.42 FEET;
8) THENCE ALONG THE ARC OF A CURVE TO THE RIGHT HAVING A RADIUS OF 4503.66 FEET AND A CENTRAL ANGLE OF 00°24'57", AN ARC DISTANCE OF 32.68 FEET (CHORD BEARS N89°16'27"W, 32.68 FEET) MORE OR LESS TO THE EASTERLY LINE OF A PARCEL OF LAND DESCRIBED IN DEED RECORDED IN THE BOULDER COUNTY CLERK AND RECORDER'S OFFICE AT RECEPTION NO. 129929;
9) THENCE N00°34'38"W ALONG SAID EASTERLY LINE, A DISTANCE OF 10.12 FEET;
10) THENCE S89°04'12"E, A DISTANCE OF 154.40 FEET;
11) THENCE N87°30'48"E, A DISTANCE OF 394.65 FEET;
12) THENCE ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 1982.42 FEET AND A CENTRAL ANGLE OF 09°23'03", AN ARC DISTANCE OF 324.69 FEET (CHORD BEARS N82°49'16"E, 324.33 FEET);
13) THENCE N78°087'45"E, A DISTANCE OF 229.14 FEET;
14) THENCE ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 1535.81 FEET AND A CENTRAL ANGLE OF 05°20'00", AN ARC DISTANCE OF 142.96 FEET (CHORD BEARS N75°27'45"E, 142.91 FEET);
15) THENCE N72°47'45"E, A DISTANCE OF 174.81 FEET;
16) THENCE ALONG THE ARC OF A CURVE TO THE RIGHT HAVING A RADIUS OF 1516.30 FEET AND A CENTRAL ANGLE OF 08°07'20", AN ARC DISTANCE OF 214.95 FEET (CHORD BEARS N76°51'36"E, 214.77 FEET);
17) THENCE N80°55'05"E, A DISTANCE OF 584.15 FEET;
18) THENCE N77°54'00"E, A DISTANCE OF 300.00 FEET;
19) THENCE N74°52'36"E, A DISTANCE OF 507.50 FEET;
20) THENCE ALONG THE ARC OF A CURVE TO THE RIGHT HAVING A RADIUS OF 1590.16 FEET AND A CENTRAL ANGLE OF 11°56'15", AN ARC DISTANCE OF 331.31 FEET (CHORD BEARS N68°54'48"E, 330.71 FEET) TO THE TRUE POINT OF BEGINNING CONTAINING 1.18 ACRES, MORE OR LESS.

CONTAINING 103.44 ACRES, MORE OR LESS, SUBJECT TO PUBLIC RIGHT-OF-WAY FOR BOULDER COUNTY ROAD NO. 52, VALMONT DRIVE, SEE NOTE #2.

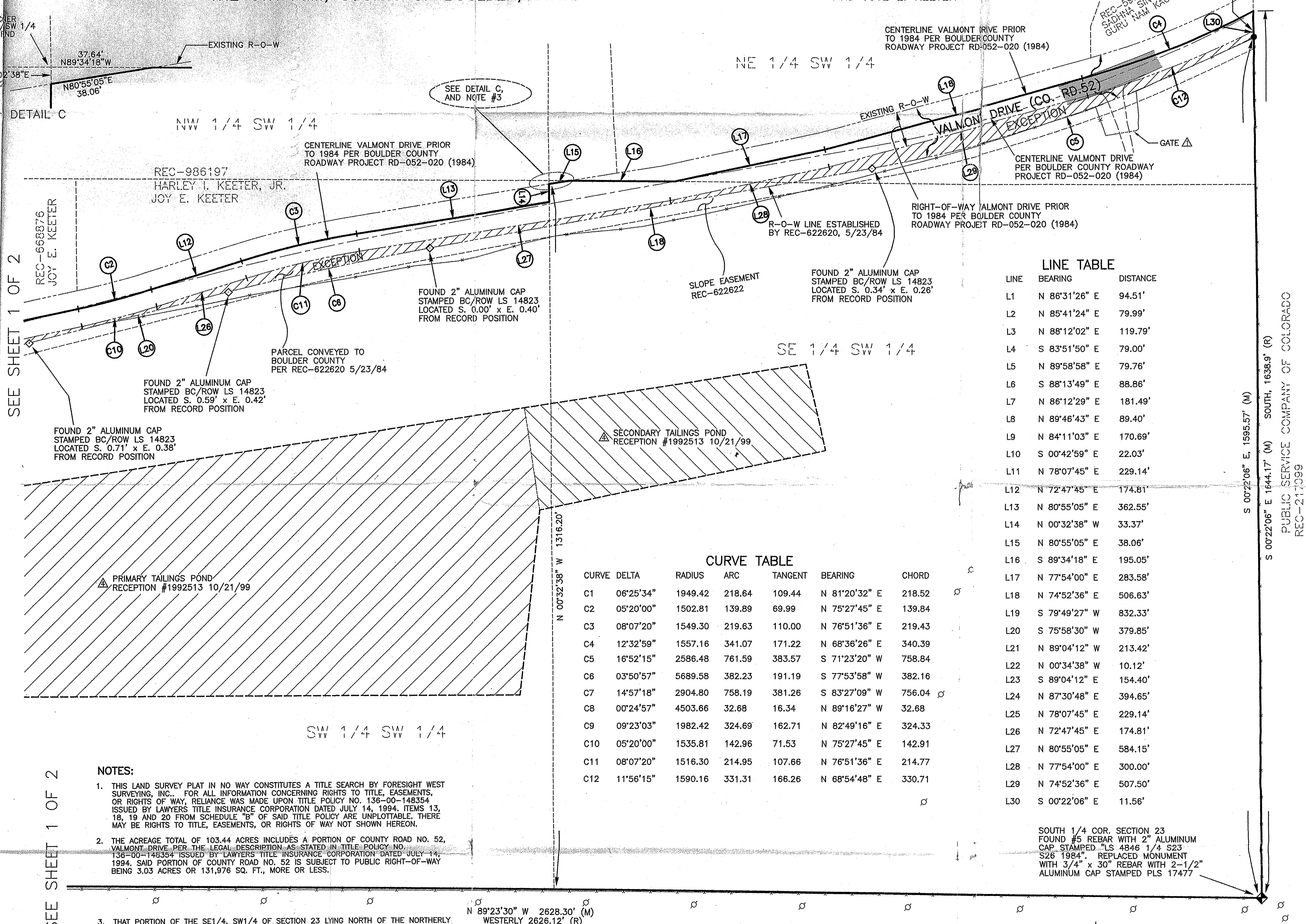
SURVEYOR'S CERTIFICATE:

I, John W. Christy, Colorado Professional Land Surveyor no. 17477, hereby certify to Valmont Butte Corporation that the boundary survey shown hereon was completed by me and under my responsible charge in December of 1996, and that said survey was deposited in the records of Boulder County on June 11, 1997 under reception no. LS970104. No recertification of said 1996 survey is intended or implied herewith. I further certify that, at the request of Valmont Butte Corporation, I have delineated hereon specific access routes to the property as well as easements recorded since June of 1997 which affect the property, and I have field inspected the boundary for apparent encroachments subsequent to June of 1997. No encroachments were found, except as shown hereon. I further certify that this plat is not an improvement survey plat, and that significant improvements exist on the property which are not depicted hereon.

JOHN W. CHRISTY REGISTERED 17477 8/10/00 LAND SURVEYOR STATE OF COLORADO

PLAT2436.DWG Last Update: 04/14/2k

D:\LesSmith\Valmont\Valmont2000\SHEET-2-NEW.dwg Wed Aug 09 21:35:30 2000



CURVE TABLE

CURVE	DELTA	RADIUS	ARC	TANGENT	BEARING	CHORD
C1	06°25'34"	1949.42	218.64	109.44	N 81°20'32" E	218.52
C2	05°20'00"	1502.81	139.89	69.99	N 75°27'45" E	139.84
C3	08°07'20"	1549.30	219.63	110.00	N 76°51'36" E	219.43
C4	12°32'59"	1557.16	341.07	171.22	N 68°36'26" E	340.39
C5	16°52'15"	2586.48	761.59	383.57	S 71°23'20" W	758.84
C6	03°50'57"	5689.58	382.23	191.19	S 77°53'58" W	382.16
C7	14°57'18"	2904.80	758.19	381.26	S 83°27'09" W	756.04
C8	00°24'57"	4503.66	32.68	16.34	N 89°16'27" W	32.68
C9	09°23'03"	1982.42	324.69	162.71	N 82°49'16" E	324.33
C10	05°20'00"	1535.81	142.96	71.53	N 75°27'45" E	142.91
C11	08°07'20"	1516.30	214.95	107.66	N 76°51'36" E	214.77
C12	11°56'15"	1590.16	331.31	166.26	N 68°54'48" E	330.71

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 86°31'26" E	94.51'
L2	N 85°41'24" E	79.99'
L3	N 88°12'02" E	119.79'
L4	S 83°51'50" E	79.00'
L5	N 89°58'58" E	79.76'
L6	S 88°13'49" E	88.86'
L7	N 86°12'29" E	181.49'
L8	N 89°46'43" E	89.40'
L9	N 84°11'03" E	170.69'
L10	S 00°42'59" E	22.03'
L11	N 78°07'45" E	229.14'
L12	N 72°47'45" E	174.81'
L13	N 80°55'05" E	362.55'
L14	N 00°32'38" W	33.37'
L15	N 80°55'05" E	38.06'
L16	S 89°34'18" E	195.05'
L17	N 77°54'00" E	283.58'
L18	N 74°52'36" E	506.63'
L19	S 79°49'27" W	832.33'
L20	S 75°58'30" W	379.85'
L21	N 89°04'12" W	213.42'
L22	N 00°34'38" W	10.12'
L23	S 89°04'12" E	154.40'
L24	N 87°30'48" E	394.65'
L25	N 78°07'45" E	229.14'
L26	N 72°47'45" E	174.81'
L27	N 80°55'05" E	584.15'
L28	N 77°54'00" E	300.00'
L29	N 74°52'36" E	507.50'
L30	S 00°22'06" E	11.56'

NOTES:

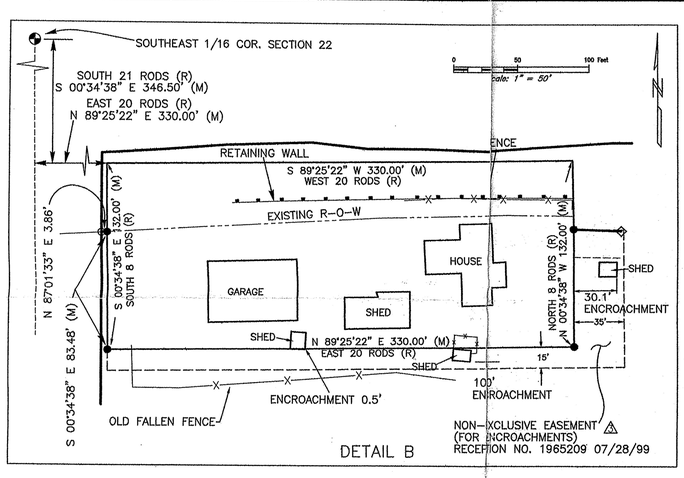
1. THIS LAND SURVEY PLAT IN NO WAY CONSTITUTES A TITLE SEARCH BY FORESIGHT WEST SURVEYING, INC.. FOR ALL INFORMATION CONCERNING RIGHTS TO TITLE, EASEMENTS, OR RIGHTS OF WAY, RELIANCE WAS MADE UPON TITLE POLICY NO. 136-00-148354 ISSUED BY LAWYERS TITLE INSURANCE CORPORATION DATED JULY 14, 1994. ITEMS 13, 18, 19 AND 20 FROM SCHEDULE "B" OF SAID TITLE POLICY ARE UNPLOTTABLE. THERE MAY BE RIGHTS TO TITLE, EASEMENTS, OR RIGHTS OF WAY NOT SHOWN HEREON.
2. THE ACREAGE TOTAL OF 103.44 ACRES INCLUDES A PORTION OF COUNTY ROAD NO. 52, VALMONT DRIVE PER THE LEGAL DESCRIPTION AS STATED IN TITLE POLICY NO. 136-00-148354 ISSUED BY LAWYERS TITLE INSURANCE CORPORATION DATED JULY 14, 1994. SAID PORTION OF COUNTY ROAD NO. 52 IS SUBJECT TO PUBLIC RIGHT-OF-WAY BEING 3.03 ACRES OR 131,976 SQ. FT., MORE OR LESS.
3. THAT PORTION OF THE SE1/4, SW1/4 OF SECTION 23 LYING NORTH OF THE NORTHERLY RIGHT-OF-WAY LINE OF VALMONT DRIVE IS INCLUDED IN TITLE POLICY NO. 136-00-148354 LEGAL DESCRIPTION FOR THE PROPERTY. THIS PARCEL BEING 0.003 ACRES MORE OR LESS IS ALSO INCLUDED IN RECEPTION NO. 986197 AS OWNED BY HARLEY I. KEETER, JR. & JOY E. KEETER. SAID PARCEL HAS BEEN EXCLUDED FROM THE ACREAGE TOTAL IN THIS SURVEY, SUBJECT TO FURTHER LEGAL REVIEW.
4. THAT PORTION OF THE WESTERLY BOUNDARY OF THIS PROPERTY ADJOINED BY WMI-BOULDER, INC. IS SUBJECT TO INTERPRETATION OF OLD AND POTENTIALLY AMBIGUOUS LEGAL DESCRIPTIONS. TO PREVENT POTENTIAL GAPS OR OVERLAPS RELIANCE WAS MADE UPON A SURVEY PERFORMED BY ROBERT M. SAYRE, P.L.S. NO. 11372, PERFORMED IN JUNE, 1989 AND DEPOSITED IN BOULDER COUNTY LANDUSE DEPARTMENT LS-89-0055.
5. BASIS OF BEARINGS: BEARINGS ARE BASED UPON THE SOUTH LINE OF THE SOUTHEAST 1/4 OF SECTION 22 AS EVIDENCED BY MONUMENTATION DEPICTED HEREON, SAID LINE BEARING S 89°50'33" W AS DETERMINED BY SOLAR OBSERVATION.

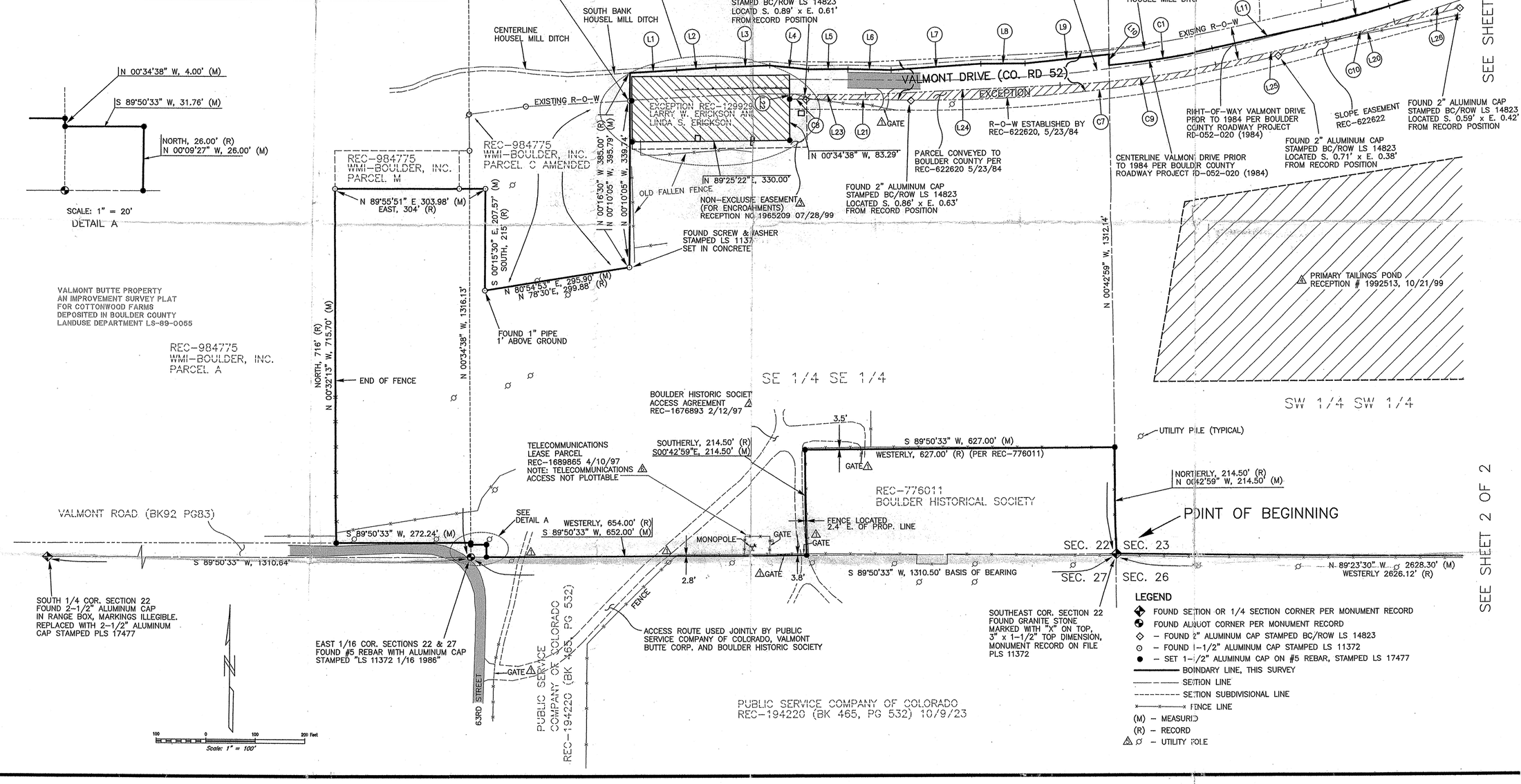
NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

NOTICE: THE CERTIFICATION SHOWN HEREON DOES NOT EXTEND TO ANY UNNAMED PERSONS OR LEGAL ENTITIES WITHOUT WRITTEN RECERTIFICATION EXPRESSLY NAMING SUCH PERSONS OR LEGAL ENTITIES.

LAND SURVEY PLAT

A PART OF THE S 1/2 OF THE SE 1/4 OF SECTION 22 AND THE SW 1/4 OF SECTION 23, TOWNSHIP 1 NORTH, RANGE 70 WEST OF THE 6TH P.M., COUNTY OF BOULDER, STATE OF COLORADO





D:\LesSmith\Valmont\Valmont2000\SHEET-1-NEW.dwg REV: AUG 03 21:20:04 2000

PLOTSCRIPT: Last Update: 04/14/26

APPENDIX C

WARRANTY DEED

WARRANTY DEED

THIS DEED, dated this 5th day of September, 2000, between VALMONT BUTTE CORPORATION, a Colorado corporation as to an undivided 2/3 interest, and LINCOLN TRUST COMPANY, a Colorado Corporation, as custodian for benefit of William G. Smith, as to an undivided 1/3 interest, of the said County of Boulder and State of Colorado, grantors, and the CITY OF BOULDER, a Colorado home rule city, grantee, whose legal address is 1777 Broadway, Boulder, Colorado 80302.

3-1

WITNESS, that the grantors, for and in consideration of the sum of ($2,575,000.00) TWO MILLION FIVE HUNDRED SEVENTY-FIVE THOUSAND DOLLARS, the receipt and sufficiency of which is hereby acknowledged, have granted, bargained, sold and conveyed, and by these presents does grant, bargain, sell, convey and confirm unto the grantee, its successors and assigns forever, all the real property, together with improvements, if any, situate, lying and being in the County of Boulder and State of Colorado, described as follows:

71718

SEE EXHIBIT A ATTACHED

also known by street and number as: N/A
assessor's schedule or parcel numbers: 0036714, 0036853, 0036854 & 0036856

TOGETHER with all and singular the hereditaments and appurtenances thereunto belonging, or in anywise appertaining, the reversion and reversions, remainder and remainders, rents, issues and profits thereof, and all the estate, right, title, interest, claim and demand whatsoever of the grantors, either in law or equity, of, in and to the above bargained premises, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said premises above bargained and described, with the appurtenances, unto the grantee, its successors and assigns forever. The grantors, for themselves, their heirs, personal representatives, successors and assigns, do covenant, grant, bargain, and agree to and with the grantee, its successors and assigns, that at the time of the ensealing and delivery of these presents, they are well seized of the premises above conveyed, have good, sure, perfect, absolute and indefeasible estate of inheritance, in law, in fee simple, and have good right, full power and lawful authority to grant, bargain, sell and convey the same in manner and form as aforesaid, and that the same are free and clear from all former and other grants, bargains, sales, liens, taxes, assessments, encumbrances and restrictions of whatever kind or nature soever, except taxes for 2000 and subsequent years and all easements, restrictions and reservations of record.

The grantors shall and will WARRANT AND FOREVER DEFEND the above bargained premises in the quiet and peaceable possession of the grantee, its successors and assigns, against all and every person or persons lawfully claiming the whole or any part thereof.

The singular number shall include the plural, the plural the singular, and the use of any gender shall be applicable to all genders.

IN WITNESS WHEREOF, the grantors have executed this deed on the date set forth above.

By: _____
Title: Vice President
VALMONT BUTTE CORPORATION, a Colorado Corporation

By: _____
Title: Manager
LINCOLN TRUST COMPANY, a Colorado Corporation, as custodian for benefit of William G. Smith

STATE OF COLORADO)
) ss.
County of Arapahoe)

The foregoing instrument was acknowledged before me this 1 day of September 2000, by Beverly Cason for LINCOLN* and _____
* TRUST COMPANY, a Colordo Corporation as custodian for benefit of William G. Smith
Witness my hand and official seal.
My commission expires:

_____
Notary Public

SANDRA ROYNON
NOTARY PUBLIC
STATE OF COLORADO
My Commission Expires 09/17/2002

STATE OF COLORADO)
COUNTY OF BOULDER) ss.

The foregoing instrument was acknowledged before me this 5th day of September, 2000, by Tim Smith, Vice President of VALMONT BUTTE CORPORATION, a Colorado corporation.

Witness my hand and official seal.
My commission expires: September 28, 2000

_____
Notary Public

EXHIBIT "A"

LEGAL DESCRIPTION

PARCEL A:

Part of Sections 22 and 23, Township 1 North, Range 70 West of the 6th P.M., described as follows:

Beginning at the Southeast corner of said Section 22; thence Northerly along the East line of said Section 22, a distance of 214.50 feet; thence Westerly and parallel with the South line of said Section 22, a distance of 625.00 feet; thence Southerly and parallel with the East line of said Section 22, a distance of 214.50 feet to the South line of said Section 22; thence Westerly along the South line of said Section 22, a distance of 654.00 feet; thence North, 26.00 feet; thence West, 304.00 feet; thence North 720.00 feet; thence East, 304.00 feet; thence South, 315.00 feet; thence North 78°30' East, 299.88 feet; thence North 00°16'30" West, 385.00 feet to the South bank of the Housel Mill Ditch; thence Northeasterly along the South bank of said Housel Mill Ditch to the East line of said Section 22; thence Southerly along said East line to the centerline of County Road No. 1 as shown on the recorded Plat of said County Road No. 1 which is recorded in Public Roads Book C at Page 87; thence Northeasterly along the centerline of said County Road No. 1 to the East line of the SW1/4SW1/4 of said Section 23; thence Northerly along said East line to the Northwest corner of the SE1/4SW1/4 of said Section 23; thence Easterly along the North line of said SE1/4SW1/4 to the centerline of said County Road No. 1; thence Northeasterly along the centerline of said County Road No. 1 to the East line of the NE1/4SW1/4 of said Section 23; thence South along the East line of the SW1/4 of said Section 23, a distance of 1,638.90 feet to the South Quarter corner of said Section 23; thence Westerly along the South line of said Section 23, a distance of 2,626.12 feet to the POINT OF BEGINNING;

EXCEPT a parcel in the SE1/4SE1/4 of said Section 22, described as follows:

Commencing at the Northwest corner of said Southeast 1/4 of the Southeast 1/4; thence South, 21 rods; thence East, 20 rods to the TRUE POINT OF BEGINNING;thence South, 8 rods; thence East, 20 rods; thence North, 8 rods; thence West, 20 rods to the TRUE POINT OF BEGINNING.

PARCEL B:

Part of the Southeast 1/4 of the Southwest 1/4 of Section 22, Township 1 North, Range 70 West of the 6th P.M., described as follows:

Beginning at the Southeast corner of the Southwest 1/4 of said Section 22; thence North along the East line of said Southwest 1/4, a distance of 355.26 feet; thence South 36°39' West, 433.80 feet; thence on a 20° curve to the right to the South line of said Southwest 1/4; thence East along said South line to the POINT OF BEGINNING.

PARCEL C:

Part of the Southeast 1/4 of the Southwest 1/4 of Section 22, Township 1 North, Range 70 West of the 6th P.M., described as follows:

Beginning at the Southeast corner of the Southwest 1/4 of said Section 22; thence North along the east line of said Southwest 1/4, a distance of 355.26 feet; thence South 47° West to the South line of said Southwest 1/4; thence East along said South line to the POINT OF BEGINNING;

EXCEPT that parcel described herein as Parcel B;

AND EXCEPT from the above tracts any portion thereof conveyed by Lucile C. Cannon to Design Products, Inc., in Deed recorded December 20, 1965 on Film 534 as Reception no. 802406.

AND EXCEPT portions deeded to Boulder County by deeds recorded May 23, 1984 on Film 1303 as Reception Nos. 622620 and 622628;

AND EXCEPT any portions thereof conveyed to The Colorado Brick Company, Inc., by deed recorded September 14, 1987 on Film 1495 as Reception No. 876679.

All being in the County of Boulder, State of Colorado.

FIRST
COLORADO
TITLE CORPORATION

2299 Pearl Street / Boulder, Colorado 80302-4671
(303) 449-8442 / FAX: (303) 449-3273

RECEIVED
SEP 29 2000

September 21, 2000

City of Boulder
P. O. Box 791
Boulder, CO 80306
Attn: Wally Cameron

RE: CASE NO. 71718

Enclosed herewith is your Owner's Policy of Title Insurance. It is your guarantee of ownership and contains valuable information concerning the property insured. THIS DOCUMENT IS VALUABLE - KEEP IT IN A SAFE PLACE.

First Colorado Title Corporation has compiled and retained a permanent complete file on the property search and examination leading to the issuance of this policy and we will gladly answer any questions that you have concerning it. Any future policies of title insurance which you may require on this property can be promptly issued by reference to the Case No. shown hereon and, in all cases, THERE WILL BE A SUBSTANTIAL SAVINGS ON THE PREMIUM.

We are pleased to have had the opportunity to serve you and we look forward to serving any title insurance needs you may have in the future.

Sincerely yours,

Patricia A. Melvin

Patricia A. Melvin
President

Lawyers Title Insurance Corporation

NATIONAL HEADQUARTERS
RICHMOND, VIRGINIA

SCHEDULE A

OWNER'S POLICY

CASE NUMBER	DATE OF POLICY	AMOUNT OF INSURANCE	ENDORSEMENTS	POLICY NUMBER
71718	September 7, 2000 at 8:00 am	$2,575,000.00		A75-0193345

1. Name of Insured:

CITY OF BOULDER,
a Colorado home rule city

Premium: $2,674.50

2. The estate or interest in the land which is encumbered by this policy is:

FEE SIMPLE

3. Title to the estate or interest in the land is vested in:

CITY OF BOULDER,
a Colorado home rule city

4. The land referred to in this policy is described as follows:

SEE ATTACHED EXHIBIT "A"

Countersignature Authorized Officer or Agent

Issued at Boulder, Colorado

This Policy is invalid unless the cover sheet and Schedule B are attached.

EXHIBIT "A"

LEGAL DESCRIPTION

PARCEL A:

Part of Sections 22 and 23, Township 1 North, Range 70 West of the 6th P.M., described as follows:

Beginning at the Southeast corner of said Section 22; thence Northerly along the East line of said Section 22, a distance of 214.50 feet; thence Westerly and parallel with the South line of said Section 22, a distance of 625.00 feet; thence Southerly and parallel with the East line of said Section 22, a distance of 214.50 feet to the South line of said Section 22; thence Westerly along the South line of said Section 22, a distance of 654.00 feet; thence North, 26.00 feet; thence West, 304.00 feet; thence North 720.00 feet; thence East, 304.00 feet; thence South, 215.00 feet; thence North 78°30' East, 299.88 feet; thence North 00°16'30" West, 385.00 feet to the South bank of the Housel Mill Ditch; thence Northeasterly along the South bank of said Housel Mill Ditch to the East line of said Section 22; thence Southerly along said East line to the centerline of County Road No. 1 as shown on the recorded Plat of said County Road No. 1 which is recorded in Public Roads Book C at Page 87; thence Northeasterly along the centerline of said County Road No. 1 to the East line of the SW1/4SW1/4 of said Section 23; thence Northerly along said East line to the Northwest corner of the SE1/4SW1/4 of said Section 23; thence Easterly along the North line of said SE1/4SW1/4 to the centerline of said County Road No. 1; thence Northeasterly along the centerline of said County Road No. 1 to the East line of the NE1/4SW1/4 of said Section 23; thence South along the East line of the SW1/4 of said Section 23, a distance of 1,638.90 feet to the South Quarter corner of said Section 23; thence Westerly along the South line of said Section 23, a distance of 2,626.12 feet to the POINT OF BEGINNING;

EXCEPT a parcel in the SE1/4SE1/4 of said Section 22, described as follows:

Commencing at the Northwest corner of said Southeast 1/4 of the Southeast 1/4; thence South, 21 rods; thence East, 20 rods to the TRUE POINT OF BEGINNING;thence South, 8 rods; thence East, 20 rods; thence North, 8 rods; thence West, 20 rods to the TRUE POINT OF BEGINNING.

PARCEL B:

Part of the Southeast 1/4 of the Southwest 1/4 of Section 22, Township 1 North, Range 70 West of the 6th P.M., described as follows:

Beginning at the Southeast corner of the Southwest 1/4 of said Section 22; thence North along the East line of said Southwest 1/4, a distance of 355.26 feet; thence South 36°39' West, 433.80 feet; thence on a 20° curve to the right to the South line of said Southwest 1/4; thence East along said South line to the POINT OF BEGINNING.

Continued....

EXHIBIT "A"

LEGAL DESCRIPTION

CONTINUED, PAGE 2

PARCEL C:

Part of the Southeast 1/4 of the Southwest 1/4 of Section 22, Township 1 North, Range 70 West of the 6th P.M., described as follows:

Beginning at the Southeast corner of the Southwest 1/4 of said Section 22; thence North along the east line of said Southwest 1/4, a distance of 355.26 feet; thence South 47° West to the South line of said Southwest 1/4; thence East along said South line to the POINT OF BEGINNING;

EXCEPT that parcel described herein as Parcel B;

AND EXCEPT from the above tracts any portion thereof conveyed by Lucile C. Cannon to Design Products, Inc., in Deed recorded December 20, 1965 on Film 534 as Reception no. 802406.

AND EXCEPT portions deeded to Boulder County by deeds recorded May 23, 1984 on Film 1303 as Reception Nos. 622620 and 622628;

AND EXCEPT any portions thereof conveyed to The Colorado Brick Company, Inc., by deed recorded September 14, 1987 on Film 1495 as Reception No. 876679.

All being in the County of Boulder, State of Colorado.

Lawyers Title Insurance Corporation

OWNER'S POLICY

CASE NUMBER

71718

SCHEDULE B

POLICY NUMBER

A75-0193345

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:

1. Rights or claims of parties in possession not shown by the public records.
2. Easements, or claims of easements, not shown by the public records.
3. Discrepancies, conflicts in boundary lines, shortage in area, encroachments, and any facts which a correct survey and inspection of the premises would disclose and which are not shown by the public records.
4. Any lien, or right to a lien for services, labor, or material heretofore or hereafter furnished, imposed by law and not shown by the public records.
5. Unpatented mining claims; reservations or exceptions in patents or in Act authorizing the issuance thereof; water rights, claims or title to water.
6. Taxes for the year 2000, a lien not yet due and payable, Special Assessments and charges not certified to the county treasurer.
7. Easement and right of way for Butte Mill Ditch, not exceeding one rod in width, as granted by John A. Ellet to The Butte Irrigating and Milling Company in instrument recorded March 19, 1890, in Book 137 at Page 303, in which the specific location of said easement is not defined.
8. Any rights as may exist, by an agreement recorded February 13, 1943 in Book 725 at Page 444, as to the construction and maintenance of a water pipeline. The location of said pipeline and the terms and conditions of said Agreement is more fully set forth therein.
9. Any rights as may exist, by an agreement recorded November 26, 1954 in Book 965 at Page 319, as to the construction and maintenance of a water pipeline. The location of said pipeline and the terms and conditions of said Agreement is more fully set forth therein.
10. An easement for the construction, operation and maintenance of water and electric service as granted to WMI - Boulder, Inc., by document recorded July 10, 1989 on Film 1586 as Reception No. 991812, the location of said easement more fully set forth therein, also being subject to the terms and conditions set forth therein.
11. Any rights as to the Housel Ditch as set forth in Decree recorded in Book 1098 at Page 43.
12. Any rights to Colorado-Wyoming Gas Company for the construction and maintenance of a pipeline under a portion of said property by Agreement dated August 10, 1961, all of which is set forth in Deed recorded December 29, 1976 on Film 949 as Reception No. 205012.
13. A perpetual easement granted to the County of Boulder by document recorded on Film 1303 as Reception No. 622618, the location of said easement is more fully set forth therein.
14. A perpetual easement for slope granted to the County of Boulder by document recorded May 23, 1984 on Film 1303 as Reception No. 622622. The location of said easement is more fully set forth therein.
15. Easement and right of way for the installation, construction, repair, maintenance and reconstruction of sewer utility line as granted by Lucile C. Cannon to the City of Boulder in instrument recorded October 13, 1966, on Film 584 as Reception No. 829586, said easement being 25 feet in width, 12.50 feet on each side of the centerline more fully set forth therein. (Affects Parcel C)
16. Easements, Terms, Conditions, and Obligations set forth in Agreement recorded July 28, 1989 on Film 1588 as Reception No. 994980.

Continued....

17. Terms, conditions and obligations set forth in Lease by and between Tusco, Incorporated, a Nevada Corporation, Lessor, and Hendricks-Good Milling Co., a Colorado Corporation, Lessee, recorded September 26, 1980 on Film 1135 as Reception No. 414522, and Simplified Mill Lease With Right of First Refusal recorded August 5, 1988 on Film 1540 as Reception No. 934191.

18. Any rights as may exist as to the Butte Mill Ditch as shown on the Boulder County Assessors Map, and as referenced in various documents of record.

19. An Oil and Gas Lease, and any and all assignments thereof, dated June 17, 1980, executed by Tusco, Incorporated, a nevada Corporation, as Lessor, and Martin Exploration Management Corp., as Lessee, for a term of 3 years, recorded June 18, 1980 on Film 1121 as Reception No. 399683.

20. Easement and right of way for county Road No. 52 (Valmont Drive and Valmont Road).

21. Easements, terms, conditions, covenants and obligations set forth in Access Agreement recorded February 12, 1997 on Film 2185 as Reception No. 1676893.

22. An easement over said land as set forth in document recorded July 28, 1999 as Reception No. 1965209 and being subject to terms and conditions set forth therein.

23. Terms, conditions, covenants and obligations set forth in Agreement recorded October 21, 1999 as Reception No. 1992513.

24. Any loss, discrepancies or conflicts as to boundaries due to location of fences as disclosed on Revised Land Survey Plat by Foresight West Surveying, Inc.

25. Such rights of others as may exist in utility poles as disclosed by Revised Land Survey Plat by Foresight West Surveying, Inc.

Form 110.1
$35.00

Lawyers Title Insurance Corporation

NATIONAL HEADQUARTERS
RICHMOND, VIRGINIA

ENDORSEMENT

CODE NAME	NUMBER
400	71718

Attached to and made a part of Lawyers Title Insurance Corporation No. A75-0193345

Said Policy is hereby amended by deleting Paragraphs 1 thru 4 Schedule B-Part I.

The total liability of the Company under said policy and any endorsements therein shall not exceed, in the aggregate, the face amount of said policy and costs which the Company is obligated under the Conditions and Stipulations thereof to pay.

This endorsement is made a part of said policy and is subject to the schedules, conditions and stipulation therein, except as modified by the provisions hereof.

This endorsement is not to be construed as insuring the title to said estate or interest as of any later date than the date of said policy, except as herein expressly provided as to the subject matter hereof.

The total liability of the Company under said policy, binder or commitment and under this and any prior endorsements thereto shall not exceed, in the aggregate, the amount of liability stated on the face of said policy, binder or commitment, as the same may be specifically amended in dollar amount by this or any prior endorsements, and the costs which the Company is obligated to pay under the Conditions and Stipulations of the policy.

This endorsement is made a part of said policy, binder or commitment and is subject to all the terms and provisions thereof, except as modified by the provisions hereof.

Nothing herein contained shall be construed as extending or changing the effective date of the aforesaid policy, binder or commitment unless otherwise expressly stated.

IN WITNESS WHEREOF, the Company has caused this Endorsement to be signed and sealed as of the 7th day of September, 2000, to be valid when countersigned by an authorized officer or agent of the Company, all in accordance with its By-Laws.

Lawyers Title Insurance Corporation

Issued at Boulder, Colorado

By: Maurice C. Bowling, Jr.
President

COUNTERSIGNED:

Julinda Smith
Authorized Officer or Agent

Attest:
Secretary.

Form 91-11-A (Rev. 4/76)
035-2-091-1100/1

APPENDIX D

WATER WELL SURVEY

TABLE D-1

ONE-HALF MILE WATER WELL SURVEY
VALMONT BUTTE PROPERTY
BOULDER, COLORADO

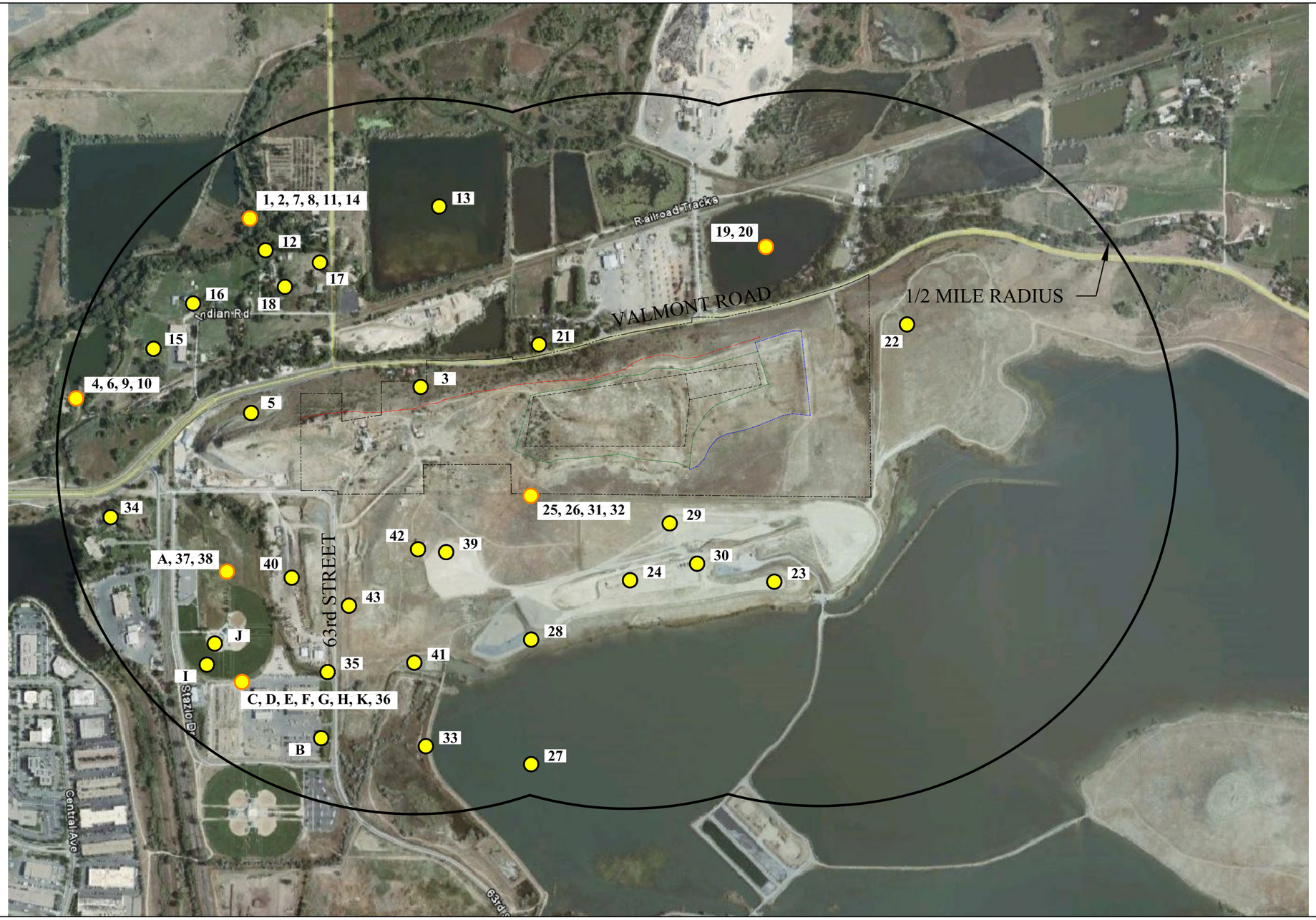
MAP #	PERMIT	SUF	RECEIPT	OWNER	ADDRESS1	CITY	STATE	ZIP	ACTIVITY CODE	WD	TS	TDIR	RNG	RDIR	SEC	COORDS NS	COORDS NS DIR	COORDS EW	COORDS EW DIR	USE	FIRST USED DATE	ANN APR	AREA IRR	AQUIFER	YIELD	DEPTH	LEVEL
1	218	RN	9008139	OWEN ZELLA and WILBUR	R 2 BX 375	BOULDER	CO	80302	NP	6	1	N	70	W	22					Domestic				GW	14	11	8
2	219	RN	9008140	OWEN ZELLA and WILBUR	R 2 BX 375	BOULDER	CO	80302	NP	6	1	N	70	W	22					Domestic				GW	10	10	5
3	2364		9008336	HORENBERGER HARRY	RT 2 BX 453	BOULDER	CO	80302		6	1	N	70	W	22					Domestic				GW	20	25	5
4	4073		9008479	PANCOST CHARLES P	RT 2 BX 447	BOULDER	CO	80302		6	1	N	70	W	22					Domestic				GW	25	30	8
5	4558		9008508	CULLEN ELIZABETH	6005 VALMONT ROAD	BOULDER	CO	80304-	NP	6	1	N	70	W	22					Domestic	9/25/1959			GW	25	31	6
6	5748		9008619	PANCOST CHARLES	RT 2 BX 364	BOULDER	CO	80302		6	1	N	70	W	22					Domestic				GW	20	26	10
7	8265		9008802	LAUBACH GEORGE C	RR 2 BOX 376	BOULDER	CO	80302		6	1	N	70	W	22					Domestic				GW	14	30	7
8	17898		9009625	SCHERMERHORN LEO	RT 2 BOX 367	BOULDER	CO	80302		6	1	N	70	W	22					Domestic				GW	60	30	6
9	18077		9009647	MARTIN GLENN	RT 2 BOX 375 B	BOULDER	CO	80302		6	1	N	70	W	22					Domestic				GW	20	31	5
10	18078		9009648	BURDICK CHAY	5998 INDIAN ROAD	BOULDER	CO	80301-		6	1	N	70	W	22					Domestic	11/21/1963			GW	0.58	30	8
11	26242		9010238	BOTUR FREDDIE	6027 INDIAN RD	BOULDER	CO	80301-	NP	6	1	N	70	W	22					Domestic	1/18/1966			GW	4	31	6
12	50382		9011785	GIBBS DARREL E	6003 INDIAN RD	BOULDER	CO	80302		6	1	N	70	W	22	3499	N	1869	E	Domestic				GW	21	21	9
13	113369		201822	VALMONT PRESBY		BOULDER	CO	80302	NP	6	1	N	70	W	22					Domestic Household Only	2/7/1980			GW			
14	123781		221026	KEETER B		BOULDER	CO	80301	EP	6	1	N	70	W	22					Domestic Household Only	11/10/1981			GW			
15	151394		0283800A	ROGERS DONALD R.		LOUISVILLE	CO	80027	NP	6	1	N	70	W	22	1060	S	2580	W	Domestic	1/14/1988			GW	15	20	
16	151395		9014183	ROGERS DONALD R.	PO BOX 850	LOUISVILLE	CO	80027		6	1	N	70	W	22	1380	S	2330	E	Domestic				GW	15	20	
17	152418		291865	VONESCHEN BOB	2036 GROVE ST	BOULDER	CO	80302	NP	6	1	N	70	W	22	1800	S	1380	E	Domestic	8/31/1988	1	3	GW	15	16	
18	229576		466526	OROSEL MICHAEL and KAREN	6029 INDIAN RD	BOULDER	CO	80301-	NP	6	1	N	70	W	22	1600	S	1700	E	Domestic	9/14/2000			GW		0	
19	14860		9009382	SAWHILL GEORGE E	RT 2 BOX 359	BOULDER	CO	80302		6	1	N	70	W	23					Domestic				GW	32	36	21
20	45746	F	370443	KEETER JR HARLEY and JOY	6379 VALMONT DR	BOULDER	CO	80301	NP	6	1	N	70	W	23					Gravel Pit	6/2/1994			GW			
21	48930	F	31886	BOTTERILL JOHN R/JAN M HOUCK	6327 VALMONT RD	BOULDER	CO	80301	NP	6	1	N	70	W	23	1105	S	234	W	Domestic	10/6/1997			GW			
22	170073		352484	KEETER HARLEY I and JOY E	6379 VALMONT RD	BOULDER	CO	80301	NP	6	1	N	70	W	23	1200	S	2300	E	Domestic Household Only	5/5/1993			GW			
23	16879	MH	16879	PUBLIC SERVICE CO OF CO	555 17TH ST STE 1200	DENVER	CO	80202-3912	MH	6	1	N	70	W	26					Monitoring	10/2/1990			GW			
24	41045	MH	41045	XCEL ENERGY	414 NICOLLET MALL	MINNEAPOLIS	MN	55401-	MH	6	1	N	70	W	26					Monitoring	7/19/2002			GW		105	
25	47168	MH	47168	MCCARTER JENNIFER	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	MH	6	1	N	70	W	26	15	N	300	W	Monitoring	7/2/2007			GW		65	65
26	47169	MH	47169	MCCARTER JENNIFER	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	MH	6	1	N	70	W	26	547	N	2528	W	Monitoring	7/2/2007			GW		23	12
27	105201		102196	MUSSER ROBERT W	PO BOX 4012	BOULDER	CO	80306	NP	6	1	N	70	W	26	2025	N	150	W	Domestic	1/29/1979			GW	2	520	60
28	257834		0524872A	XCEL ENERGY	1800 N 63RD ST	BOULDER	CO	80302-	NP	6	1	N	70	W	26	1050	N	100	W	Monitoring	5/24/2004			KP		39	
29	257835		0524872B	XCEL ENERGY	1800 N 63RD ST	BOULDER	CO	80302-	NP	6	1	N	70	W	26	320	N	1100	W	Monitoring	5/24/2004			KP		105	

CASEY RESOURCES, INC.

TABLE D-1

ONE-HALF MILE WATER WELL SURVEY
VALMONT BUTTE PROPERTY
BOULDER, COLORADO

MAP #	PERMIT	SUF	RECEIPT	OWNER	ADDRESS1	CITY	STATE	ZIP	ACTIVITY CODE	WD	TS	TDIR	RNG	RDIR	SEC	COORDS NS	COORDS NS DIR	COORDS EW	COORDS EW DIR	USE	FIRST USED DATE	ANN APR	AREA IRR	AQUIFER	YIELD	DEPTH	LEVEL
30	257836		0524872C	XCEL ENERGY	1800 N 63RD ST	BOULDER	CO	80302-	NP	6	1	N	70	W	26	650	N	1300	W	Monitoring	5/24/2004			KP		50	
31	275212		3620930A	PUBLIC SERVICE OF COLO DBA XCEL	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	NP	6	1	N	70	W	26	547	N	2528	W	Monitoring	9/6/2007			GW		23	
32	275213		3620930B	PUBLIC SERVICE OF COLO DBA XCEL	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	NP	6	1	N	70	W	26	15	N	300	W	Monitoring	9/6/2007			GW		65	
33	10966	AD	10778	PUBLIC SERVICE CO OF CO	2655 N 63RD ST	BOULDER	CO	80301	AD	6	1	N	70	W	27					Irrigation	10/28/1985			GW			
34	14142	F	9009304	MAXWELL GEORGE S	810 KALMIA	BOULDER	CO	80302		6	1	N	70	W	27	40	N	2425	W	Commercial			5	GW	28	30	4
35	14637	MH	14637	BOULDER CITY OF	C/O 96 S ZUNI	DENVER	CO	80223	MH	6	1	N	70	W	27					Monitoring	11/14/1988			GW			
36	18740	MH	18740	PUBLIC SERVICE CO OF CO	C/O 1801 BROADWAY ST 1300	DENVER	CO	80202	MH	6	1	N	70	W	27					Monitoring	2/26/1992			GW			
37	18927	MH	18927	BOULDER CITY OF % RADIAN CORP	1801 BROADWAY #1300	DENVER	CO	80202	MH	6	1	N	70	W	27					Monitoring	4/9/1992			GW			
38	32423	MH	32423	WESTERN DISPOSAL	C/O WALSH ENVIRO INC 4888 PEARL E CIR #108	BOULDER	CO	80301	MH	6	1	N	70	W	27					Monitoring	8/5/1997			GW			
Not Plotted	41600	MH	41600	WESTERN DISPOSAL INC	C/O CDM 1331 17TH ST STE 1200	DENVER	CO	80202-	AB	6	1	N	70	W	27					Monitoring	12/10/2002			GW			
39	47167	MH	0047167A	MCCARTER JENNIFER	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	MH	6	1	N	70	W	27	432	N	500	E	Monitoring	7/2/2007			GW		66	18
40	153532		295387	COLORADO BRICK CO	6032 VALMONT RD	BOULDER	CO	80302	EP	6	1	N	70	W	27	500	N	1600	E	Irrigation	12/22/1988			GW			
Not Plotted	173951		0357754A	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1760	N	1408	E	Abandoned	7/20/1993	0		GW	0	9	
Not Plotted	173952		0357754B	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1408	N	1725	E	Abandoned	7/20/1993	0		GW	0	14	
Not Plotted	173953		0357754C	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1373	N	1725	E	Abandoned	7/20/1993	0		GW	0	14	
Not Plotted	173954		0357754D	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1373	N	1878	E	Abandoned	7/20/1993	0		GW	0	9	
Not Plotted	173955		0357754E	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1408	N	1901	E	Abandoned	7/20/1993	0		GW	0	9	
Not Plotted	173956		0357754F	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1408	N	1830	E	Abandoned	7/20/1993	0		GW	0	13	
Not Plotted	173957		0357754G	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1408	N	1971	E	Abandoned	7/20/1993	0		GW	0	8	
Not Plotted	173958		0357754H	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1237	N	2218	E	Abandoned	7/20/1993	0		GW	0	13	
Not Plotted	173959		0357754I	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1126	N	2182	E	Abandoned	7/20/1993	0		GW	0	13	
Not Plotted	173960		0357754J	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1232	N	1936	E	Abandoned	7/20/1993	0		GW	0	8	
Not Plotted	173961		0357754K	PUBLIC SERVICE CO OF CO	PO BOX 840 1225 17TH ST STE 2000	DENVER	CO	80201-840	AB	6	1	N	70	W	27	1267	N	2042	E	Abandoned	7/20/1993	0		GW	0	13	
41	275214		3620930C	PUBLIC SERVICE OF COLO DBA XCEL ENERGY	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	NP	6	1	N	70	W	27	1111	N	600	E	Monitoring	9/6/2007			GW		30	18
42	275215		3620930D	PUBLIC SERVICE OF COLO DBA XCEL ENERGY	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	NP	6	1	N	70	W	27	432	N	500	E	Monitoring	9/6/2007			GW		66	18
43	275216		3620930E	PUBLIC SERVICE OF COLO DBA XCEL ENERGY	C/O APEX CONSULTING SERVICES PO BOX 369	LOUISVILLE	CO	80027-	NP	6	1	N	70	W	27	1260	N	1155	E	Monitoring	9/6/2007			GW		30	



EXPLANATION

- Property Boundary
- Covenant Boundary
- Prairie Dog Control Fence
- Valmont Butte Ridge

40 Water well location and number from Table (A-1)

25, 26, 32 Multiple water wells sited at same location. Well numbers from Table A-1.

N

Scale: 1.0 Inch = 800'
Aerial Photograph from Google Earth

Valmont Butte Property Boundary based on April 14, 2000 Land Survey Plat

FIGURE D-1

WATER WELL LOCATIONS
VALMONT BUTTE PROPERTY
3000 NORTH 63rd STREET
BOULDER, COLORADO

APPENDIX E

CONFIRMATION SOIL SAMPLING AND ANALYSIS PLAN

VCUP SAMPLING AND ANALYSIS PLAN

FOR THE

VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO

June 2010

Prepared For:

City of Boulder
1720 13th Street
Boulder, Colorado 80306

Prepared By:

Casey Resources Inc.
4890 Kipling Street
Wheat Ridge, Colorado 80033
(303) 940-7800

TABLE OF CONTENTS

Page #

1.0 INTRODUCTION 1

2.0 RADIATION AND TOTAL LEAD REMEDIATION CRITERIA 2

3.0 SOIL SCREENING PROCEEDURES 3

3.1 TOTAL LEAD SCREENING PROCEDURE 3
3.2 RADIATION RATE SCREENING PROCEDURE 4

4.0 CONFIRMATION SOIL SAMPLING 5

4.1 CONFIRMATION SOIL SAMPLING FOR TOTAL LEAD 5
4.2 CONFIRMATION SOIL SAMPLING FOR RADIOCHEMICAL ANALYSIS 7

5.0 DECONTAMINATION PROCEDURE 7

6.0 DOCUMENTATION 8

7.0 REFERENCES 10

1.0 INTRODUCTION

The City of Boulder (the "City") owns an approximate 101-acre parcel of land locally known as the Valmont Butte property (the "Property"). The City has completed a number of environmental investigations at the Property and has prepared a Voluntary Cleanup Plan ("VCUP") Application for remediation of the Property.

The VCUP Application was prepared to address heavy metals and radiation impacts that were generated from the milling and processing of fluorspar and gold ores. The tailings generated from the processing of ores at the mill were deposited in two tailings ponds located in the central part (primary tailings pond) and eastern side (secondary tailings pond) of the Property. The areas of the primary tailings pond and the secondary tailings pond are estimated at 12.5 acres and 4.5 acres, respectively. Mining residuals placed in the primary and secondary tailings ponds have been exposed over the years by nature due to the fact that an effective cap was never placed on the tailings pond areas.

In addition to the mining residuals contained in the tailings ponds, Property investigations completed in 2009 also identified mining residuals outside of the primary and secondary tailings pond areas. The mining residuals contain concentrations of metals that exceed the State of Colorado's proposed soil cleanup values for worker/commercial use, which for the Property has been defined as non-accessible Open Space/Open Use land designations.

The VCUP Application proposes excavation of the secondary tailings and mining residuals areas outside the tailings ponds with consolidation of these mining residuals in the primary tailings pond area. An engineered cap consistent with EPA recommendations will then be constructed on the primary tailings pond. As a secondary mining residuals stabilization approach, capping in place may be necessary at culturally sensitive areas located on the Property. In addition, heavily vegetated areas that contain concentrations of total lead that exceed the proposed action level of 800 milligrams per kilogram ("mg/Kg"), such as the north slope of Valmont Butte, will be left undisturbed to allow the existing vegetative growth to continue to be a permanent protective cover against erosion.

Remediation of mining residuals areas outside the tailings ponds (referred to hereafter as "outside mining residual areas") and at the secondary tailing pond will require real-time assessment of mining residual concentrations as the excavation progresses and, on completion, will also require the collection of confirmation samples to demonstrate adequate remediation meeting cleanup criteria. This plan, herein, presents the field screening procedures that will be utilized for real-time field assessment of the excavation activities and the confirmation soil sampling procedures to be conducted following completion of excavation.

2.0 RADIATION AND TOTAL LEAD REMEDIATION CRITERIA

The VCUP Application for the Property proposed remediation cleanup values that support non-accessible Open Space and Open Use (worker/commercial use values). The secondary tailings pond and outside mining residual areas will be excavated until the soil exposed in the base of the excavation is determined to meet the following cleanup criteria:

- Total lead concentration in soil ≤ 800 mg/Kg = Screening and confirmation sampling meeting no further action (CDPHE, 2007 worker/commercial land use).

- External radiation exposure rate ≤ 48 micro-roentgens per hour ("µR/hr") above background (20 µR/hr) measured at waist level = Screening value of ≤ 68 µR/hr meeting no further action (Derived from industrial/commercial exposure scenario, CDPHE regulations @ 6 CCR 1007 -1, Part 4, *Standards for Protection Against Radiation, para. 4.14*); and

- Radiation concentration in surface soil (0 -15 centimeters ["cm"]) ≤ 5 pico-curies per gram ("pCi/gram") radium 226 and/or 228 above background = Confirmation sampling (EPA 40 CFR 192.33, CDPHE regulations @ 6 CCR 1007 -1, Part 18, Appendix A, criteria 6).

3.0 SOIL SCREENING PROCEEDURES

It is anticipated that outside mining residual areas will initially be excavated to the greatest depth of impact identified during the 2009 sampling program. For example, if the greatest depth of impact identified was 1.5 feet, the entire outside mining residual area will be excavated to 1.5 feet regardless if a grid within the outside mining residual area was identified as having impact only to 0.5 foot depth. This excavation procedure will allow for effective and time efficient remediation of the outside mining residual area. Excavation of the secondary tailings pond area will be based on the URS Operating Services ("URS") data regarding depth of mining residuals and by the physical characteristics (color, grain size, and matrix) of the excavated materials.

As the secondary tailings pond and outside mining residual areas are excavated, the exposed soil in the base of the excavation will be screened for total lead concentration and radiation exposure rates to determine when excavation can be terminated. Screening procedures for total lead concentration and radiation exposure rates are discussed in the following sections.

3.1 TOTAL LEAD SCREENING PROCEDURE

Total lead screening will be completed using a field portable X-ray fluorescence ("XRF") analyzer. The XRF analyzer selected for excavation screening is the Alpha Series XRF manufactured by Innov-X Systems. This XRF analyzer was previously used at the Property during the 2009 soil investigations completed by Casey Resources, Inc. ("CRI"). Prior to initiation of the 2009 soil sampling program, a correlation study was conducted using XRF analysis and laboratory analysis to determine a correction factor for the response of the XRF to total lead in onsite soils. A discussion of the correlation study is presented in Appendix A of the CRI (2009) report *Identification and Confirmation of Soils Requiring Long Term Management*. The correlation study resulted in "correction factors" that were used to adjust XRF data to the likely concentration that a laboratory would report. The correction factors developed for the 2009 soil investigation data will be used for XFR total lead concentration data generated during the remediation screening program.

The initial screening process will involve real-time in-situ measurement for total lead concentration in the outside mining residual area as subsurface soils are exposed during excavation or grading. This method of real-time analysis will provide efficient use of the heavy equipment as the operator can be instructed to continue with excavation or move to another excavation area.

The Alpha Series XRF can provide a reasonable magnitude estimate of the total lead concentration in soil generally within approximately 30 seconds. Because the in-situ XRF measurements will be used to determine if additional soil should continue to be removed based on the cleanup criterion of 800 mg/Kg, the magnitude estimate of total lead can be used for this purpose.

Once the initial excavation of mining residuals is completed, the XRF field technician will measure total lead concentrations in the excavation bottom to assess where and if additional soil should be removed. The locations for in-situ measurements of the excavation bottom will be at random generally spaced at 20 feet to 30 feet distance throughout the exposed excavation. The XRF technician will use flagging or spray paint to designate areas that require further excavation. This process will continue until the soil exposed in the excavation bottom meets the total lead concentration of ≤ 800 mg/Kg based on field in-situ XRF screening.

3.2 RADIATION RATE SCREENING PROCEDURE

Radiation exposure measurements will be conducted during excavation activities primarily as a health and safety measure as no areas were identified on the Property that exceeded the CDPHE criterion of 48 µR/hr above background. Background concentration was established at 20 µR/hr during the 2009 investigations at the Property. Health and safety radiation monitoring will be described in the Health and Safety Plan ("HASP") for the project. Environmental screening for radiation rate will be conducted as soils are exposed to establish if additional soil removal is required. Based on previous investigations, excavation of outside mining residual areas D, F, G, and those areas around the Mill Building may encounter soil exhibiting elevated radiation rates.

Radiation screening will be conducted in real-time using a µR meter (Ludlum series 3, 12, 19, or equivalents)/scaler ratemeter and scintillation probe (e.g., Ludlum Model 2221 or 2241 series portable scaler ratemeters with Model 44-10 sodium iodide (NaI) gamma scintillator or equivalent). The µR meter/scaler ratemeter with scintillation probe will be calibrated relative to uranium series radionuclides and/or with a pressurized ion chamber in the field and will be performance verified daily (gamma check source) before conducting radiation screening surveys.

Once the initial soil removal activity is completed, the radiation technician will establish transects spaced at approximately 25 feet apart and walk these lines with the µR meter/scaler ratemeter and scintillation probe held at approximately waist level to emulate an effective ("whole body") dose rate. If radiation rates exceeding the action rate of 68 µR/hr are observed, the area will be marked with flagging or spray paint. Additional monitoring of the marked locations will be conducted to further define the areal extent of soil exhibiting values greater than 48 µR/hr above background. This will be accomplished by surveying radial lines outward from the location until measurements are less than the screening value. This process will be used until the elevated radiation area is fully defined so that additional soil can be removed. After additional soil is removed, the screening will be conducted again until the exposed soil meets the 48 µR/hr above background criterion.

4.0 CONFIRMATION SOIL SAMPLING

The surface soil sampling procedures for collection of total lead and radiation confirmation samples from the remediated areas are discussed in the following sections.

4.1 CONFIRMATION SOIL SAMPLING FOR TOTAL LEAD

Once the excavation meets the total lead cleanup criteria based on field XRF screening, confirmation soil samples will be collected to provide evidence that adequate removal was completed. Locations for confirmation sampling will be established by dividing the excavation bottom into approximately 50-foot grids with a composite sample collected from each grid (one composite sample per 2,500 square feet). If the excavation area is less than or equal to 2,500

square feet, one composite sample will be collected. Composite soil samples representative of each grid or excavation area ≤ 2,500 square feet will be collected by the following method:

- Soil grab samples from the top six inches of the soil profile will be collected near each corner and center of each grid. If the excavation area is ≤ 2,500 square feet, five soil grab samples will be collected at random locations within the excavation. Grab samples will be collected with a decontaminated stainless steel trowel. The volume of each grab sample will be approximately 8 to 12 ounces.

- The five soil grab samples will be placed into a single plastic sealable freezer storage bag, thoroughly mixed (composited), and XRF field measurement made as a preliminary quality assurance check. (Note: Should the field XRF field measurement indicate total lead concentration greater than 800 mg/Kg, the excavation bottom will require additional soil removal and in-situ field screening.)

- Field personnel will record the GPS location of the center of the sampled grid, describe the soil sample lithology, and the field screening result in the project field log book for each composite soil sample collected.

Following field measurement, the composite sample will be dried and ground to a powder consistency, generally following the Environmental Protection Agency ("EPA") Method 6200 for XRF analysis. Once ground, an XRF sample cup will then be filled with approximately 30 grams of the powdered sample. The prepared sample will then be measured with the XRF using a sample run time of two minutes. At least five XRF measurements will be completed on the sample and the results documented. The average of the five results (adjusted with the previously determined correlation factor) will represent the confirmation concentration for total lead for that grid or ≤ 2,500 square feet excavation area. If the confirmation concentration is greater than 800 mg/Kg for total lead, then additional excavation will be required for that grid. It is anticipated that use of the in-situ field screening (Section 3.1.1) will limit the need for additional excavation.

For quality assurance, at least one prepared soil sample from each outside mining residual excavation area will be submitted for laboratory analysis of total lead and arsenic using EPA Method 6010. For the secondary tailings pond excavation, one in 10 XRF confirmation samples will be submitted to the laboratory. The laboratory data will be used as additional confirmation that adequate remediation was completed.

Duplicate soil samples will be collected for every 20 soil samples submitted to the laboratory.

4.2 CONFIRMATION SOIL SAMPLING FOR RADIOCHEMICAL ANALYSIS

As mentioned previously, the 2009 Property investigations did not identify any areas on the Property that exceeded the CDPHE criterion of 68 µR/hr. During excavation of mining residuals, any area that is identified during screening as exceeding the radiation rate criterion will be further assessed after excavation is completed by collecting confirmation soil samples for radiochemical analysis. At a minimum, five confirmation soil samples will be collected from each of those areas previously identified as exhibiting elevated radiation rates (outside mining residual areas D, F, G, and the areas around the Mill Building) and two confirmation soil samples collected from the secondary tailings pond excavation.

A decontaminated stainless steel scoop will be used to collect a soil sample from the exposed surface to approximately six inches (15 cm) below the exposed bottom of the excavation or to refusal. Sufficient volume will be collected for laboratory analysis (specified by the laboratory but typically approximately 200 to 300 grams). Collected soil samples will be placed into plastic sealable freezer storage bags and thoroughly mixed and submitted to a certified radiochemical environmental laboratory for analyses of total uranium, radium 226/228 and gross alpha/beta**.**

Duplicate soil samples will be collected for every 20 soil samples submitted to the laboratory.

5.0 DECONTAMINATION PROCEDURE

Equipment used for sampling will be decontaminated as follows:

- Scrub with laboratory-grade detergent;
- Rinse with potable water;
- Rinse with distilled water; and
- Dried with paper towels and/or air dried.

After decontamination, the sampling equipment will be stored in plastic bags or covered with plastic sheeting.

Wash and rinse water generated during decontamination will be contained onsite in 55-gallon drums or other suitable containers. On completion of the VCUP implementation program, the drum contents will be sampled and analyzed by an environmental laboratory for total lead and arsenic. If elevated radiation levels are indicated using the µR meter, the contents will also be analyzed for radionuclides (total uranium, radium 226/228, gross alpha/beta). Based on the laboratory results, the decontamination water could potentially be used for dust control and other onsite uses in restricted areas on the Property. If the laboratory results indicate the decontamination water is not suitable for onsite use, the water will be treated at Arvada Treatment Center or possibly the City of Boulder's wastewater treatment plant assuming the decontamination water meets industrial discharge requirements. Otherwise, alternative treatment options will be identified.

Field vehicles will be inspected and any large quantities of mud removed from the underside of the vehicles and tires. If necessary a decontamination wash area will be constructed and the wash water collected in 55-gallon drums.

6.0 DOCUMENTATION

Bound field log books will be issued to field personnel to document all activities conducted at the Property. Field personnel will document field measurements, sampling procedures and locations, type of samples, sample lithology and condition, equipment used, personnel working onsite, and site

conditions. Each page of the log book will be numbered sequentially. The date and name of field personnel entering the log (logger) will be placed on the top of the first page for that day. On finishing the day's entry, the final page will be signed by the logger, dated again, and any unused space below will be marked out. All errors or markouts on the entries will be initialed by the logger. Sufficient documentation will be maintained in order to effectively complete the Remediation Construction Completion Report required to document completion of the VCUP.

7.0 REFERENCES

Casey Resources, Inc. (CRI), 2009. *Identification and Confirmation of Soils Requiring Long Term Management, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado*. November 24, 2009.

Colorado Department of Public Health and Environment (CDPHE), 2007. *Table 1 Colorado Soil Evaluation Values (CSEV) – December 2007.*

URS Operating Services, Inc., 2005. *Analytical Results Report for Site Reassessment, Valmont Butte/Allied Piles, Boulder, Colorado.* Prepared for the U.S. Environmental Protection Agency. January 1, 2005.

APPENDIX F

IMPORT SOILS PROTOCOL

IMPORT SOILS PROTOCOL FOR VALMONT BUTTE TAILINGS IMPOUNDMENT CAP RESTORATION

VALMONT BUTTE PROPERTY
BOULDER, COLORADO

INTRODUCTION

Casey Resources, Inc. ("CRI") has prepared this protocol to document the procedures to be followed for the import of clean soils to the Valmont Butte property (the "Property") located in Boulder, Colorado to support final closure of the Property. The protocol was developed specifically for the import of clean soil to be used for capping of the tailings impoundments located at the Property and as backfill in any areas that are excavated as part of the final closure of the Property.

The soil import and capping activities will be permitted by the Boulder County Land Use Department following requirements of the Limited Impact Special Review found in the Boulder County Land Use Code updated December 18, 2008. The capping design will be described in a Voluntary Cleanup Plan (VCUP) Application submitted to the Colorado Department of Public Health and Environment (CDPHE).

The soil import protocol herein shall be strictly adhered to for all soil import sources, regardless of volume or source area. The intent of the protocol is to ensure that any soil, concrete, or rock imported to the site does not contain quantities of any contaminant that will render it unusable in support of final closure of the Property.

Soils from offsite borrow sites or other fill sources identified for potential use on the Property are to be screened for environmental and geotechnical suitability using the protocol set out in this document to ensure that such soils are suitable for unrestricted residential use. <u>Under no circumstances shall imported soils be brought onto the Property without proper screening and documentation</u>.

CHARACTERIZATION AND EVALUATION OF SOIL SOURCE

Prior to initiating any soil sampling and testing, the history of the site from which the subject soils are being generated ("Offsite Source") shall be assessed to determine whether the soils originate from an appropriate Offsite Source and to prepare as necessary an appropriate screening approach and analytical suite for soil sampling and testing. Any contractor or City of Boulder ("City") entity proposing the use of soils from an Offsite Source shall provide the location of the Offsite Source and all available site information to Bill Boyes, City Project Manager, and CRI's Materials Management Coordinator ("MMC"). If insufficient data are provided, a basic Phase I Environmental Site Assessment ("ESA") screening package will be

obtained for the Offsite Source. In general, an ESA screening package will include 1) a review of available government records for environmental sites within a one-mile radius of the Offsite Source, 2) aerial photograph review back to approximately 1940, and Sanborn Map review, if available. The MMC shall determine if the history of the Offsite Source makes the soils acceptable or precludes the soils as a viable fill source (e.g., a site with a heavy industrial history that has documented soil contamination or a site where leaking underground tanks were removed would be eliminated as a potential borrow source). The City Project Manager will determine if temporary storage of soil on the Property is acceptable. For the Property remediation and cap design, if the Offsite Source is generally acceptable, the MMC shall develop a soil screening and sampling approach and analytical suite for soil sampling based on the available history provided for the Offsite Source. Testing shall include assessment of geotechnical properties to determine if the soils are acceptable as capping material for the tailings impoundment or other backfill areas. The geotechnical tests will be determined by a geotechnical consultant chosen by the City.

Import soils for onsite use will be free of frozen material, organic material, and debris (roots, wood, peat, cinders, trash, or other deleterious materials) and will have a maximum particle size of six-inches in diameter. Import soils for onsite use must be capable of being compacted to the minimum specified density for the project (assume 95% Proctor). Import rock or crushed concrete will also be free of frozen material, organic material, and debris (roots, wood, peat, cinders, trash, or other deleterious materials). Import rock or crushed concrete for the cap will contain 85% nominal size from six inches to 18 inches in diameter, with no rock or concrete fragments greater than 18 inches and no more than 0 to 7% fines passing the 200-mesh sieve. At a minimum, gradation analysis at a frequency of one gradation analysis per 10,000 cubic yards or portion thereof will be required for import soil and rock/crushed concrete.

Soils for onsite use will <u>not</u> be brought onto the Property without the approval of the MMC and the selected geotechnical consultant. Approval from the MMC and geotechnical consultant will be in written form provided to the contractor and City Project Manager.

FREQUENCY FOR ENVIRONMENTAL TESTING

In general, borrow sources for onsite use less than 5,000 cubic yards will not be acceptable and will not be approved for this project. If the Offsite Source is a large capacity source and the operator of that source provides a signed certification letter stating that the source soils meet the CDPHE proposed residential guideline values for soil and provides supporting analytical data, no testing of import soil will be required.

Alternatively, the contractor shall collect soil samples from the proposed Offsite Source and submit these samples to an environmental laboratory for analysis (discussed in next section). Additional samples will be collected at a minimum frequency of one in every 2,000 cubic yards (approximately one composite per 120 truck loads). Samples shall be a representative composite sample of each 2,000 cubic yard increment of soil. Method of sample collection will be

determined by the MMC. Receipt of analytical results must occur prior to the import of any materials to the Property.

If during the continual screening of the borrow soils, the MMC observes continuing consistency from an appearance perspective, the MMC may decrease the frequency of testing while maintaining adequate documentation of' the material being imported. Suitable frequencies may be 1 in 3,000 cubic yards up to 1 in 5,000 cubic yards depending on the consistency and size of the borrow source. In addition, if the import soil matrix and analytical results are consistent, the MMC will have the option to discontinue laboratory analysis and use only field screening methods as outlined in the following section.

ANALYSIS TO BE CONDUCTED

The MMC will determine the analytical suite for import soils based on the available history. At a minimum, initial soil samples collected at an Offsite Source shall be analyzed for the following:

- Total Petroleum Hydrocarbons (TPH, full hydrocarbon chain) by EPA Method 8015;
- Volatile Organic Compounds (VOCs) by EPA Method 8260;
- Polynuclear Aromatic Hydrocarbons (PAHs) by EPA Method 8270;
- RCRA Metals List of 8 by EPA Method 6020/7471; and
- Radiation (field survey equipment).

Additional analysis may be required based on the history of the Offsite Source or if little to no information is available. These additional analyses include, but are not limited to, the following.

- Chlorinated pesticides by EPA Method 8081;
- Chlorinated herbicides by EPA Method 8151; and
- Poly-chlorinated biphenyls (PCBs) by EPA Method 8082.

Concentrations of any contaminants detected in soil samples must be less than those concentrations enumerated in the CDPHE 2007 proposed soil cleanup values for residential use to ensure that the import soils are clean. All analytical results must exhibit detection limits that are below (or near) the proposed CDPHE values for a given analyte/compound. The only exception will be total arsenic concentrations that must be less than 10 milligrams per kilogram ("mg/Kg") and for PAH values that are not obtainable with current analytical methods (i.e., benzo(a)pyrene and dibenzo(a,h)anthracene at 22 micrograms per kilogram). Radiation values should be equal to or less than 30 micro roentgens per hour (µR/hr).

Import soils will be screened in the field using portable equipment (photoionization meter [PID] for VOCs, X-ray fluorescence [XRF] meter for metals, radiation meters, etc.) and visual observations. The MMC will have the option to submit any collected soil samples to the environmental laboratory for analysis.

Should the source soil change in appearance or is suspect based on field screening, the MMC will have the option to stop the import or have the material segregated into separate stockpiles until the suspect soil is analyzed by the environmental laboratory and determined to be clean.

DOCUMENTATION

On completion of the tailings impoundments cap restoration, CRI will prepare a Construction Completion Report documenting all activities completed under the VCUP Application. Included in the Construction Completion Report will be a discussion of import soil. The discussion will include descriptions of the locations where any import soils were placed, the quantity of soil placed, the Offsite Source, the history of the Offsite Source, the sampling and screening protocol implemented and the analytical results of the sampling performed. Environmental disclosures, record-keeping, and a copy of the Construction Completion Report will be provided to the City.