Addendum No. 2

Prairie Dog Lethal Control and Continuation of Barrier Fence

October 10, 2008

This addendum to the Valmont Butte Site Health and Safety Plan (HASP) is provided to address additional site work activities scheduled through 2008 including lethal control protocol for the Prairie Dogs residing on the tailing pond cap and for construction of an additional 2700 linear feet of Prairie Dog barrier fence located south and east of the secondary tailing pond. The HASP addresses safety and health hazards associated with the Valmont Butte site.

Per the City of Boulder Valmont Butte Prairie Dog Lethal Control Protocol (October, 2008), a City of Boulder contractor will place carbon monoxide (CO) canisters into the Prairie Dog burrows located on the tailing pond cap. The Contractor is required to adhere by the requirements of the Site HASP as well as Addendum No. 1 (WALSH, May 20, 2008) and this Addendum.

The City's contractor(s) shall have safety programs in place to address hazards specific to their particular work activities and shall meet all requirements of the Occupational Safety and Health Administration (OSHA) 29 CFR 1926 (Construction Standard) and 29 CFR 1910 (General Industry). Specifically, during application of pyrethroid insecticide and carbon monoxide lethal control activities, the contractor must conform to the requirements of OSHA 29 CFR 1910.1000 Table Z-1 Limits for Air Contaminants.

At a minimum, personal protective equipment required while conducting site work activities on or adjacent to the tailing pond cap will include: Tyvek or cotton coveralls, nitrile or latex inner gloves under work gloves, rubber boots, and safety glasses. Sleeves and ankles will be duct taped as specified in Addendum No. 1. Steel toe boots and hard hat will be required when working around heavy equipment.

Additional site control methods include using a reach rod or other remote device to place the CO canisters into the Prairie Dog burrows. Site workers will also apply bug spray containing DEET to extremities including feet, arms and lower legs while working around Prairie Dog burrows.

A decontamination station with a garden pump sprayer will be on site for the workers to clean the rubber work boots prior to leaving the site. At the end of each work day, all disposable PPE will be placed in a lined container which will remain on site for the duration of the project.

Ronald K. Crandall

Ronald Crandall, CHMM
Senior Industrial Hygienist
Walsh Environmental Scientists and Engineers, LLC

Addendum No. 1

Revised May 20, 2008

Personal Protective Equipment for Suspect Plague

This site has been re-evaluated and determined that there is a potential to encounter Bubonic plague (infection of the lymph nodes) or Pneumonic plague (infection of the lungs) while conducting work activities or walking around the site. Plague is due to the bacterium *Yersina pestis* and is transmitted by fleas that may be found on the prairie dogs, around their burrows and carried on other wildlife hosts. The Boulder County Public Health Department recommends that workers avoid going near prairie dogs and their burrows, use DEET to repel fleas and wear personal protective equipment (PPE) while on site.

The following table specifies the appropriate level of personal protective equipment for work tasks conducted at the site.

Activity	PPE
Site inspections/reconnaissance or other work where contact with prairie dogs, burrows or soil is not suspected; includes prairie dog counts and searches for potential new burrows.	Level D 1. Rubber boots or boot covers over work boots, with pants legs tucked into boots, 2. Nitrile or latex gloves under work gloves (if handling equipment or materials), 3. Duct tape sleeves and ankles and spray with Deet, 4. Avoid placing hand or foot in burrow, 5. Be alert to flea bites and symptoms, which include flu-like symptoms and abrupt onset of fever.
Soil screening/sampling prairie dog burrows, trapping and/or relocating prairie dogs, flow fill prairie dog burrows, or other work where the potential to encounter soil or fleas is suspected and contact is possible.	Modified D 1. Tyvek or cotton coveralls, 2. Rubber boots or boot covers over work boots, 3. Apply Deet to extremities; boots and arms 4. Nitrile or latex gloves under work gloves, 5. Duct tape sleeves and ankles, 6. Avoid placing hand or foot in burrow, 7. Be alert to flea bites and symptoms, which include flu-like symptoms and abrupt onset of fever.

Ronald K. Crandall

Ronald Crandall, CHMM

Senior Industrial Hygienist

HEALTH AND SAFETY PLAN FOR VALMONT BUTTE PRAIRIE DOG BARRIER FENCE AND RELOCATION BOULDER, COLORADO

November 16, 2007

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LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Government Industrial Hygienists
AL	Action level
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
APRs	Air Purifying Respirators
CDPHE	Colorado Department of Public Health and Environment
CPR	Cardio Pulmonary Resuscitation
DAC	Derived air concentration
dB	decibel
dBA	decibel A-weighting
EPA	Environmental protection Agency
HASP	Health and Safety Plan
HPS	Hantavirus Pulmonary Syndrome
HSO	health and safety officer
LOTO	Lockout/Tagout
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter
mrem	millirem
MT	Monitoring Technician
NIOSH	National Institute for Occupational Safety and Health
NORM	Naturally Occurring Radioactive Materials
NRC	Nuclear Regulator Commission
OSHA	Occupational Safety and Health Administration
PEL	Personal Exposure Limit
PM	Project Manager
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
RSO	Radiation Safety Officer
SSHO	Site Safety and Heath Officer
STELs	short-term exposure limits
TLD	Thermoluminescent Dosimeter
TLVs	Threshold Limit Values
TWA	time-weighted average
µR/hr	microRoentgens per hour
URS	URS Corporation
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WALSH	Walsh Environmental Scientists and Engineers, LLC
XRF	X-ray spectrum fluorescent

1 INTRODUCTION

On behalf of the City of Boulder, Walsh Environmental Scientists and Engineers, LLC (WALSH) (an Ecology and Environment [E&E] company) prepared this site specific Health and Safety Plan (HASP) for the relocation of a prairie dog colony located on the Valmont Butte uranium tailing pond cap located in Boulder, Colorado. This plan discusses health and safety issues related to the relocation of prairie dogs located on the uranium tailing pond cap. This HASP is prepared for the site to be protective of the workers and public during construction of the barrier fence around the perimeter of the uranium tailings pond cap, during prairie dog trap and relocation activities, and during flow-fill of former prairie dog holes on the tailing cap.

The purpose of this site HASP is to establish personnel protection standards and mandatory worker safety and environmental protection procedures, and to ensure compliance with the applicable regulations during the work activities. The provisions of this plan are mandatory for all on-site activities. All on-site personnel are required to read and adhere to the requirements of this plan. In addition, project site personnel will receive a health and safety briefing by the health and safety officer (HSO) or designated site HSO prior to any work at the site. This HASP shall be present and readily available to site personnel during activities described in this plan. Any supplemental plans used by subcontractors during this project shall conform to this HASP at a minimum.

This HASP focuses on the unique site-specific hazards known to be present at the site such as those associated with uranium, lead, and arsenic. It is assumed that contractors hired by the City of Boulder to work on the site will have their own safety programs to deal with the hazards typically encountered in their work activities such as those covered by Occupational Safety and Health Administration (OSHA) General Industry (29 CRF 1910) and Construction Standards (29 CFR 1926).

This HASP has been prepared with available information on the hazards known to be present at the project site. The HASP specifies personal protective equipment (PPE) to address changing levels of health hazards that may arise during the work. If contamination or other hazards are found or suspected, the provisions of this HASP must be followed. If additional information or hazards are identified during site activities, this plan shall be updated to reflect any changes in the health risk analysis or air and medical monitoring procedures. This plan applies to all employees, contractors, subcontractors, and visitors.

2 SITE DESCRIPTION

The Valmont Butte site consists of more than 100 acres and is located at 3000 N. 63rd Street in Boulder County, Colorado. The site has historically been used by Native Americans for hunting and burial grounds. The fence will be constructed approximately 109 feet from the northeast corner of the privately owned cemetery. If any human remains or archeological artifacts are encountered, work shall stop and the project manager notified immediately. Portions of the site continue to be used by Native Americans for cultural purposes and ceremonies.

Portions of the Valmont Butte property have historically been used for milling and processing of mineral ores; specifically, from the 1940s until early 1974, the Allied Chemical Corporation ("Allied") processed fluoride ores mined in the Jamestown, Colorado mining district (the "Allied Operations"), and from 1977 until 1985, Hendricks Mining Company ("Hendricks") processed gold ores, principally from the Cross and Caribou mines located west of Nederland, Colorado (the "Hendricks Operations"). Approximately 300,000 cubic yards of tailings from the Allied Operations and the Hendricks Operations were deposited in a roughly 14.11-acre portion of the Valmont Butte property, near its center. That portion of the Valmont Butte property had been dammed and contoured to create a primary tailings pond and a secondary overflow tailings pond located directly east of the Primary Tailings Pond (collectively, the "Tailings Ponds"). The tailings deposit in the Primary Tailings Pond is estimated to be approximately 14 feet thick, and the tailings deposit in the Secondary Tailings Pond is estimated to be approximately 1 to 2 feet thick. The fluoride ore processed in the Allied Operations, and the resulting tailings deposited in the Tailings Ponds contained naturally occurring radioactive materials at concentrations that are greater than those native to the Valmont Butte property.

Subsequently in 1971, approximately 1500 cubic yards of soil containing low concentrations of radium from a housing construction site in the City of Boulder were deposited in the Primary Tailings Pond and capped, at or about that time, with an approximately 4-6 foot thick layer of inert clean fill material. The tailings from the Allied Operations deposited in the Primary Tailings Pond, and such capped city soils, were subsequently capped by an approximately 2 to 4-foot thick layer of inert tailings material, and by an additional approximately 2 to 4-foot thick layer of inert clean fill material. Additional radium construction debris was buried in the disposal pit located on the north side of the former mill (URS 2005).

The tailings and City Soils located in the Primary Tailings Pond are therefore currently capped and stabilized by an approximately 8 to 14-foot thick layer of inert materials in the approximate center of the Primary Tailings Pond, which layer of inert cap materials diminishes to a thickness of approximately 3 to 4 feet at the outer edges of the Primary Tailings Pond. The approximately 1 to 2-foot thick layer of tailings from the Allied Operations and the Hendricks Operations deposited in the overflow Secondary Tailings Pond is currently capped and stabilized by an approximately 2 to 4-foot thick layer of inert clean fill material.

3 SCOPE OF WORK

The scope of work is to relocate prairie dogs and construct a barrier fence around the perimeter of the primary and secondary uranium tailings pond cap. Approximately 4,700 linear feet vinyl barrier fence will be constructed around the perimeter at about 30 feet from the edge of the tailing pond cap. An independent contractor will then trap the existing prairie dogs located within the tailing pond cap area and will release them at a non-impacted area at Valmont Butte. After removal of the prairie dogs from the tailing cap, another contractor to the City will flow-fill with concrete/mortar the existing prairie dogs burrows located on the tailings cap.

In order to fully assess the soil along the proposed line of the perimeter fence, WALSH will utilize a subcontractor to conduct Geoprobe core drilling in select locations along the proposed perimeter fence line for site characterization purposes.

3.1 Site Geoprobe Drilling

Field activities will include conducting Geoprobe core drilling in select locations along the proposed perimeter fence for site characterization purposes (see Section 3.2). The soil cores will be drilled to a depth of 3 to 4 feet. Site personnel shall be fully trained on the site hazards, adhere to the site work plan, and only conduct the tasks that they are qualified to perform.

3.2 XRF Screening and Soil Sampling

An X-ray fluorescence specrtrophotometer (XRF) will be used to screen the soil at 1 and 3 foot depths for lead and arsenic. Based on field screening activities, up to eight soil samples and two quality control samples will be collected and shipped to an off-site laboratory for analysis of lead, arsenic and uranium metal by ICP. Six soil samples will also be analyzed for gamma emitters by Gamma FANP by Method PAI 713 and for gross alpha/beta by EPA Method SW9310. Dependent on availability, a rush turn-around analysis will be requested from the laboratory.

The following field soil sampling activities will be conducted for the characterization of soils at the site:

1. Utility locate and survey soil sample locations.
2. Collect samples using a soil core sleeve advanced up to 4 feet below grade.
3. Collect representative samples at 1 and 3 foot depths.
4. Place the samples into containers, label.
5. Use a NITON XRF Analyzer for lead and arsenic metals screening. All operators of the NITON XRF Analyzer shall be trained on the proper safe use of this equipment in accordance with the NITON training outline and instruction manual.
6. Select 8 to 10 samples based on highest XRF screening results for lead and arsenic.
7. Screening for radiation will be conducted using a ratemeter with an attached pancake GM probe. The soil core will be in monitored in an unshielded state (i.e., not through the sleeve and not through the sample jar) in order to get a true reading of

radioactivity. Monitoring the soil samples in this manner is also important for the protection of the workers. If the soil core levels are three times background radiation levels, then the soil core will be left at the bore hole, flagged and the immediate area shall be evacuated. The SSHO must be notified and the Geoprobe auger/stem shall be screened for radiation with the pancake rate meter. If the Geoprobe rad levels are two to three times background, the Geoprobe drill shall be decontaminated and re-checked.

8. Ship the samples under chain-of-custody to Paragon laboratory for analysis.

3.3 Fence Building Operation

Site trenching work will be conducted for the barrier fence located approximately 30 feet from the edge of the tailing pond cap. The fencing company contracted through the City of Boulder will first use a Ditch Witch to construct a trench barrier 12 inches deep along the fence line. Then a Bobcat will be used to dig the post holes about 3 feet below grade. ACQ posts (5-inch diameter by 6½ foot) will then be set about every 15 feet along the perimeter fence line. Three-inch diameter by 6½ feet ACQ posts will then be tamped into the soil at 7.5 feet centers. A 12½ gauge, high tensile fence wire will then be placed in the bottom of the trench and tensioned. A 4-foot high vinyl barrier will then be placed in the trench and attached via high tensile fence wire to the posts and to the 12½ gauge, high tensile fence wire at the bottom of the trench.

The safe operation of heavy equipment shall be conducted in accordance with OSHA regulations. Equipment operators shall be properly trained and have the proper certifications for the safe operation of heavy equipment. Real time air monitoring for total dust will be required during the first few days of site trenching activities to ensure dust levels are below the site action level. If dust levels exceed the site action level (AL), then dust suppression methods shall be utilized in the work area to control dust levels or work will stop until dust levels return to below the site A.L.

3.4 Prairie Dog Trapping and Relocation

After the barrier fence is constructed, an independent contractor to the City will trap the existing prairie dogs located within the tailing pond cap area. Non-intrusive methods will be used to capture the prairie dogs and further disturbance of the tailing cap is not expected. After the prairie dogs are captured, they will be released to a non-impacted area at Valmont Butte.

3.5 Flow Fill Operations

After installing the barrier fence and relocation of the prairie dogs, the existing prairie dogs burrows located on the tailings pond cap will be filled in with concrete/mortar flow-fill material. Non-intrusive methods will be used to fill in the existing the prairie dog burrows and further disturbance of the tailing cap is not expected.

4 PROJECT TEAM ORGANIZATION

4.1 ORGANIZATIONAL STRUCTURE

This section describes lines of authority, responsibility, and communication as they pertain to health and safety functions at this site. The purpose is to identify the personnel who will develop the site HASP and to describe the roles and responsibilities of site personnel working on site. Also identified are other contractors and subcontractors involved in work operations, with lines of communication among them for safety and health matters. This section is to be reviewed and updated as necessary to reflect the current organizational structure at this site. Table 1 shows the project team organization and responsibilities.

4.2 ROLES AND RESPONSIBILITIES

All personnel on the site must comply with the requirements of this HASP. Access to the site will be controlled by locked gates on site. The specific responsibilities and authority of management, safety and health, and other personnel on the site are detailed in the following paragraphs.

City of Boulder Project Manager

The **City of Boulder Project Manager** for this site is Bill Boyes. The City of Boulder Representative is responsible for overall project administration and technical contractor oversight. The City of Boulder Representative will serve as the primary site liaison with public agencies and officials and site contractors. The City of Boulder representative will be given a copy of the Health and Safety Plan developed for the site.

WALSH Project Manager and Site Safety and Health Officer (SSHO)

The **WALSH Project Manager and SSHO** for this site is Ronald Crandall, CHMM. The SSHO, or his designee, has full responsibility and authority to develop and implement this HASP and to verify compliance. The SSHO reports to the WALSH Corporate Health and Safety Officer (Lindsay Breyer, CIH) and the City of Boulder Project Manager. The SSHO is on site or readily accessible to the site during all work operations and has the authority to halt site work if unsafe conditions are detected. The specific responsibilities of the SSHO are to manage the safety and health functions on this site; serve as the site's point of contact for safety and health matters; ensure site monitoring, worker training, and effective selection and use of PPE; assess site conditions; assist with the preparation and review of this HASP; and maintain effective safety and health records as described in this HASP.

Ecology and Environment Health Physicist

The **Ecology and Environment Health Physicist** for this site is Donna Kassel. The health physicist has responsibility and authority to develop radiological monitoring protocol and safety controls. The SSHO reports to the health physicist to verify compliance. The specific responsibilities of the health physicist is to serve as the point of

contact for safety and health matters regarding radiological safety; ensure site radiological monitoring, effective selection and use of PPE; assess site conditions; and assist with the preparation and review of this HASP.

Project Ecologist

The **Project Ecologist** for this site is Carron Meaney. The project ecologist has responsibility and authority to direct work activities in accordance with regulatory requirements for the protection of the prairie dogs in the relocation area. The project ecologist has the authority to oversee and monitor the handling of the prairie dogs during relocation activities.

Site Workers

Site workers are responsible for complying with this HASP, using the proper PPE, reporting unsafe acts and conditions, and following the work and safety and health instructions of the PM, SSHO, and site supervisors.

City of Boulder Site Contractors

Under OSHA's multi-employer worksite enforcement policy, the City of Boulder is responsible for the safety performance of its subcontractors and has a duty to ensure that the work performed by any employer under the City's control does not create a hazard for any employees at the site.

WALSH will have its own subcontractor (DrillPro) working on site who under contractual obligations is required to follow the OSHA standards relevant to the performance of their work activities. Table 1 provides a list of names of contractors which could potentially be affected by the tasks and operations associated with this HASP.

Table 1 Project Team Organization

Company/Title	Contact
City of Boulder Project Manager	Bill Boyes
City of Boulder Parks and Recreation	Matt Claussen
Walsh Ecologist	Carron Meaney
Walsh Project Manager/SSHO	Ron Crandall
Walsh Corporate Health and Safety Officer	Lindsay Breyer, CIH
Ecology & Environment Health Physicist	Donna Kassel
Walsh Industrial Hygienist	Jason Martin
Walsh Soil Scientist	Barbara Robinson
Champion Fence Project Manager	Chad Warwick

5 SAFETY AND HEALTH RISK ANALYSIS

5.1 Known and Suspected Contamination

This work involves potential contact with soil containing elevated concentrations of uranium and heavy metals. Sources of contamination identified at the site include the uranium and radium tailings buried in the primary and secondary tailing pond. The primary uranium tailing pond has an earthen cap approximately 8-14 feet thick in the middle and 3-4 feet thick at the outer edges and the secondary tailing pond has an earthen cap of approximately 2-4 feet thick. The work will be conducted about 30 feet from the edge of the tailing pond cap; however, there is a potential to encounter elevated concentrations of lead, arsenic and uranium in the soil from migration of heavy metals from weather events and prairie dogs burrowing into the tailing pond cap.

Surface soil samples collected at the site indicated elevated concentrations of heavy metals in the parts per million (ppm) range. A limited amount of surface soil sample data gathered by Roe Ecological Services, LCC (Roe Ecological) are available for the site.

An Analytical Result Report for Site Reassessment under the U.S. Environmental Protection Agency (USEPA) Superfund Technical Assessment and Response Team 2 (START2) Region VIII was conducted by URS Operating Services (URS January 2005). The full report is available for the site. The report states contaminant concentrations within the tailing ponds and historic uranium mill operating buildings on the site. The tailings from the Burlington mine are known to contain naturally occurring radioactive materials (NORM). Fluorspar ore may also contain radium, thorium, and their respective daughter products, as well as lead, vanadium, chromium, arsenic, copper, zinc, selenium, and molybdenum. Other potential site contamination includes drums, tanks and transformers near the mill and disposal pit area. No fence construction or other work activities for this project will be conducted near the former mill area or disposal pit.

A review of the soil sample data collected in the vicinity of the proposed barrier fence along with the surface soil sample data gathered by Roe Ecological was conducted to determine potential worker exposure to uranium and heavy metals should they become airborne along the pathway of the prairie dog barrier fence, which is the most intrusive task for this for this work. Maximum site contamination data along the pathway of the barrier fence are summarized in tables 3 and 4.

5.2 Radiological Hazards and Controls

5.2.1 Radiological hazards

There is a potential to encounter elevated areas of radiation contamination and elevated radiation exposure on site. According to the URS report for Valmont Butte, the reported background for the site at that time was 19 microRoentgens per hour (μR/hr). Several prairie dog mounds located in the primary tailing ponds were found to have radiation readings of 40 to 55 μR/hr.

According to the URS report, radiation was found to be elevated in five distinct areas located around the former mill site (see Figure 1).

- The area north of the primary tailings pond dike dam (up to 75 μR/hr);
- The area along the old slurry line and disposal pit (up to 52 μR/hr);
- The mill area in front of the wood shop and around the tree stump (up to 300 μR/hr);
- The area around the mill and remaining equipment and structures (up to 150 μR/hr); and
- The ore storage area (up to 80 μR/hr).

No work activities will occur in the vicinity of the former mill and other areas described above and site personnel will be instructed to stay away from these areas (see Figure 1).

Areas of radioactive contamination identified from surface and subsurface soil sampling and radiation monitoring around the primary tailings pond and secondary tailings pond were reported to be:

- The primary and secondary tailings ponds;
- Prairie dog mounds on the primary and secondary tailings ponds (several of the mounds were found to have elevated radiation levels up to 55 μR/hr); and
- The primary tailings pond dike dam itself (up to 900 μR/hr for subsurface soil from the dam) and the area north of it. No work fence construction will take place in this area.

The site history and limited analysis of soil samples for radionuclides indicates that the primary contaminants are natural uranium (uranium-238 and -235) and its daughter products, including radium-226, and likely also natural thorium (thorium-232) and its daughter products.

To ensure that there is not a radiation safety hazard at the site, and to confirm air and soil concentrations measured during historic site sampling activities, a SSHO working under the direction of a health physicist (radiation safety specialist) will be present and equipped with radiation survey instruments to test the work areas during Geoprobe, fence construction, and prairie dog trapping activities. Pen (pocket) dosimeters will be worn by workers conducting intrusive site activities. A Thermoluminescent Dosimeter (TLD) badge is required to be worn by all site personnel.

Potential radiological hazards are described in Table 2 below.

Table 2 Potential Radiological Site Hazards

Radionuclide	DAC (µCi/ml)	Route(s) of Exposure	Major Radiation(s)	Energy(s) MeV	Half-Life
Uranium-238	2E-11	Inhalation, ingestion, dermal, external	Alpha	4.2	4.45 E+09 Years
Daughter radionuclides		Inhalation, ingestion, dermal, external	Alpha Beta Gamma	Various	Various
Radium-226	3E-10	Inhalation, ingestion, dermal, external	Alpha Gamma (Radon X-rays)	4.7 0.186	1.6E+03 Years
Radon-222	3E-08 (Daughters present)	Inhalation	Alpha Gamma (0.07% of the time)	5.5 0.51	3.8 days
Uranium-235	2E-11	Inhalation, ingestion, dermal, external	Alpha Gamma (thorium X-rays)	4.5 0.185	7.1E+08 Years
Thorium-232 and its daughters	5E-13	Inhalation, ingestion, dermal, external	Alpha Beta Gamma	Various	Various

MeV = million electron volts, Y = years, D = days
DAC = Derived air concentration

5.2.2 Radiation Dose

Dose Limits: A site-specific dose limit of 80 mrem/week has been established for this site.

ALARA Policy: Radiation dose to personnel shall be maintained as low as reasonably achievable (ALARA) taking into account the work objective, state of technology available, economics of improvements in dose reduction with respect to overall health and safety, and other societal and socioeconomic considerations.

External Dosimetry: TLD badges are required to be worn by all field personnel on this site and will serve as the permanent record of occupational dose. A site-specific dose limit of 80 mrem/week has been established for the site. Pen (pocket) dosimeters will be used on site by personnel entering areas of elevated radiation exposure and will serve as real-time dose monitoring. The pen/pocket dosimeter reading will be checked at the beginning and end of each day and their readings will be recorded in the field logbook by the SSHO or designee. A site-specific dose limit of 16 mrem/day has been established for the site. The SSHO or designee will track the pen/pocket dosimeter results throughout the work to ensure that the dose limit is not approached or exceeded.

Internal Dosimetry: Internal dosimetry is not required at this time. However, internal dosimetry may be required if site conditions change or based on the recommendation of the SSHO or RSO.

5.2.3 General Controls

Engineering/administrative controls and work practices shall be instituted to reduce and maintain employee exposures to a level at or below the permissible exposures/dose limits. Whenever engineering/administrative controls and work practices are not feasible or effective, any reasonable combination of engineering/ administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below permissible exposure/dose limits.

Engineering and administrative control measures include working upwind, avoiding contaminated materials and areas of elevated radiation where possible, and dust suppression. No work activities will occur in the vicinity of the primary tailings pond dike dam, disposal pit, former mill area, wood shop area, mill area, and ore storage area and personnel will be instructed to stay away from those areas. Equipment and materials brought into a radioactive work area should be bagged in plastic to the extent practicable for contamination prevention.

5.2.4 Radiation Surveying and Monitoring

The SSHO will monitor the work area for radiation exposure using a Ludlum Model 19 Micro R meter or equivalent. Areas with radiation exposure at levels exceeding approximately two to three times background will be considered areas of elevated radiation exposure. Such areas are an exposure/dose hazard and also indicate that radioactive contamination is nearby.

The SSHO will monitor personnel, equipment, items, and materials that leave the work area and before they cross the established hotline. Any protective plastic bags and protective clothing should be carefully removed before monitoring. The contamination monitoring will be performed with a ratemeter and an attached pancake GM detector using a slow rate (approximately one inch per second) and as close as possible to the surface without touching it. Monitoring will be performed directly (for total contamination) and indirectly (for removable contamination, using smears or swipes, if applicable). Results exceeding two times background on the pancake GM detector will indicate that the person, item, or material is contaminated and must be decontaminated.

Air sampling for gross alpha/beta radiation will be conducted on workers conducting intrusive fence construction activities (i.e., trenching and post hole digging). Air sampling will consist of breathing zone sampling with a personal pump and air filter. Health and safety monitoring is further discussed in Section 7.

5.3 Chemical Hazard and Control

The potential exists for the inhalation and/or dermal contact with the site chemical contaminants during work activities. Soil contaminants at the site have the potential to become airborne during excavation, drilling, and other intrusive activities. Site risks to site personnel due to inhalation of contaminated dust are evaluated in the following

sections. In addition, personnel may be exposed to contaminants by direct contact (skin absorption) and by accidental ingestion.

5.3.1 Dust

For dusts which contain no underlying hazardous components, OSHA has established a permissible exposure limit of 15 milligrams per cubic meter (mg/m^3). The American Conference of Government Industrial Hygienists (ACGIH) has established a threshold limit value of 10 mg/m^3 for Particles Not Otherwise Specified. These limits apply to airborne dusts which do not have another applicable exposure limit, are insoluble or poorly soluble in water, and which have low toxicity. For this project, the more conservative ACGIH Threshold Limit Value (TLV) will be used to evaluate employee exposures.

The results for the soil samples were used to calculate the maximum expected airborne concentration of each individual contaminant, based on the following assumptions:

- Airborne dust concentrations are at the ACGIH TLV of 10 mg/m^3; and
- The airborne dust has the same composition as the soils on the site.

The listed contaminants are assumed to be present in airborne dust at the site in the same relative proportions as found in the soil and sediment samples. The contaminant concentrations in the air can be estimated from the highest concentration (in milligrams per kilogram [mg/kg]) of each contaminant in the soil and as an assumed airborne dust concentration. For example, if a contaminant is found at 1000 mg/kg in the soil, then the contaminant will have an airborne concentration equal to the $1/1000^{th}$ fraction found in the airborne dust.

The maximum expected airborne contaminant concentrations were compared to the individual Personal Exposure Limits (PELs) and action levels to determine if any could be exceeded under these conditions (Table 2). In all but two cases (lead and arsenic), the maximum expected concentrations were below the respective OSHA PELs and action levels. Therefore, an action level of 1 mg/m^3 for total dust has been established for the site based on the highest concentration of lead and arsenic found in the soil. Controlling total dust levels to 1 mg/m^3 will provide adequate protection for lead, arsenic, uranium metal and other contaminants in the dust. However, should areas be encountered with higher contaminant levels, this assessment will need to be re-evaluated.

5.3.2 Heavy metals

Heavy metals detected above background concentrations at the site include arsenic, barium, cadmium, cobalt, copper, lead, manganese, mercury, silver, and zinc. The available maximum numeric data for soil samples from the site are summarized in Table 2. The results listed in the table are the maximum concentrations reported in the available documents.

The available maximum numeric data for soil samples from the site are summarized listed in tables 3 and 4.

Table 3 Maximum Surface Soil Contaminant and Calculated Air Concentration

Contaminant	Maximum Source/Soil/Sediment Concentration (mg/kg)	Calculated Air Concentration* using 1 mg/3 total dust	OSHA PEL or AL (mg/m^3)
Arsenic	19	0.000019	0.005[2]
Lead	3400	0.0034	0.03[2]
Uranium	14	0.000014	0.05 [1]

mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
[1]OSHA Permissible Exposure Limit (PEL)
[2]OSHA Action Level (AL)

Table 4 Maximum Subsurface Soil Contaminant and Calculated Air Concentration

Contaminant	Maximum Source/Soil/Sediment Concentration (mg/kg)	Calculated Air Concentration* using 1 mg/3 total dust	OSHA PEL or AL (mg/m^3)
Arsenic	340	0.00034	0.005[2]
Lead	14000	0.014	0.03[2]
Uranium	428	0.000428	0.05 [1]

mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
[1]OSHA Permissible Exposure Limit (PEL)
[2]OSHA Action Level (AL)
Contaminant air concentrations in bold potentially exceed the OSHA PEL or AL for a total dust concentration of 10 mg/m^3, therefore an action level of 1.0 mg/m^3 for total dust has been established for the site.

5.4 Exposure Limits for Site Contaminants

Known contaminants in soil and surface water at the site and their respective airborne exposure limits, including time-weighted average (TWA) limits and short-term exposure limits (STELs) are listed in Table 5. These limits are either OSHA PELs or the ACGIH TLVs or both. The ACGIH TLVs are updated annually and are typically considered by industrial hygienists to be more protective than the PELs. The OSHA PELs are enforceable regulatory limits.

Table 5 Airborne Exposure Limits for Site Contaminants

Substance	OSHA PEL (mg/m^3)	2007 ACGIH TLV (mg/m^3)	Known Carcinogen *	Skin Notation
Arsenic	0.01 PEL TWA, (0.005 Action Level)	0.01 TWA	Yes	No
Lead	0.05 PEL TWA, (0.03 Action Level)	0.05 TWA	Possible Human Carcinogen	No
Uranium	0.05 TWA	0.2 TWA	Yes	No

OSHA = Occupational Safety and Health Administration
ACGIH = American Conference of Governmental Industrial Hygienists
* = 2007 ACGIH TLV carcinogenicity category
PEL = permissible exposure limit AL = Action level
TWA = time-weighted average (8 hours) STEL = short-term exposure limit (15-minute TWA)
Ceiling = concentration that shall not be exceeded during any part of the working exposure
mg/m^3 = milligram per cubic meter

5.5 Health Effects of Site Contaminants

The health concerns associated with each contaminant are presented in Table 6.

Table 6 Health Concerns Associated with Soil Contaminants

Contaminant	Health Concern
Arsenic	Arsenic exposure can cause ulceration of the nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyper-pigmentation of the skin, and is a potential occupational carcinogen. Affected organs are the liver, kidneys, skin, lung and lymphatic cancer.
Lead	Lead exposure can cause weakness, lassitude, insomnia, eye and facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremors, wrist and ankle paralysis, encephalopathy, kidney disease, eye irritation, and hypotension. Affected organs: eyes, gastrointestinal tract, central nervous system, kidneys, blood, and is a reproductive hazard.
Uranium, thorium, and daughter radionuclides	Overexposure to uranium and thorium metal can cause kidney damage, blood changes and a potential for lung and other cancers as a result of radiation exposure (see Table 2). Target organs include skin, kidneys, bone marrow, lymphatic system.

These summaries were obtained from the NIOSH Pocket Guide to Chemical Hazards (July 2006).

6 GENERAL SITE SAFETY ISSUES

In addition to the site contaminants at may be encountered during this project, many safety risks are present during the site activities. These include the risk of slips, trips, and falls steep slopes/unstable terrain; and being injured from the use of heavy equipment. General construction safety practices in accordance with OSHA regulation 29 CFR 1926 and 1910 shall be followed during all phases of work. Table 7 lists activities and respective hazards and mitigation procedures.

Table 7 List of Activities and Respective Hazards and Mitigation

Task	Potential Hazards	Controls
Intrusive Site Activities (drilling, trenching and post hole digging)	Exposure to contaminated dusts	Use dust control when > 1 mg/m^3 to minimize the release of dust. Avoid the area immediately downwind of trenching and drilling. Proper use of PPE and air monitoring.
	Employee injuries from equipment operations	Workers trained on safe work practices and heavy equipment operation. Maintain "3-point" contact when climbing on equipment. Maintain line-of-site contact with operator. Utilize experienced operators. Inspect equipment daily; defective equipment must be repaired or replaced.
	Noise exposure	Hearing protection will be worn by heavy equipment operators when noise levels exceed 85 dBa and anyone within a 15-foot radius.
	Contact with utilities	Survey utility and lock-out/tag-out as necessary. Brief operators on hazards and maintain 10-foot working distance from utilities. Contact the Utility Notification Center of Colorado to locate any underground utilities before beginning any intrusive work.
	Lifting/working with heavy objects	Proper lifting techniques, mechanical aides, steel-toe boots.
	Radiological	Radiation meter will be used, at a minimum, during initial work activities around the barrier fence area on site. If radiation levels are determined to be two to three times above background levels or above state/federal standards, stop work and immediately notify the Site PM and HSO.
	Biological flora and fauna (Snakes, stinging insects, fleas, ticks, poison ivy, wildlife)	Workers shall wear long pants/coveralls and steel-toe boot. Avoid biological hazards by staying out of tall grasses and weeds. If a worker experiences a wasp/bee sting, flea or snakebite, the worker shall be immediately taken to seek medical attention. Immediately notify PM and SSHO.
	Weather extremes	Provide for frequent weather broadcasts. Establish site-specific contingencies for severe weather conditions. Discontinue work during severe weather.
	Fires	At a minimum a 10-lb. ABC fire extinguisher will be located on site. All refueling will be conducted either off site at a commercial filling station. Provide for frequent radio broadcasts. If a fire is encountered evacuate site immediately call 911.
	Overhead hazards	Wear hardhat.

Task	Potential Hazards	Controls
	Thermal stressors	Heat stress: wear light clothing. Conduct work during the cooler parts of the day (e.g. morning/evening). Drink plenty of water, take frequent breaks, and have access to shade. Cold stress: wear water proof and layered clothing. Have access to change of clothing, blankets, and warming shelter.
	Sunburn	Apply sunscreen, wear hats/caps and long sleeves.
Non-intrusive site activities (trap and release prairie dogs, flow fill prairie dog holes	Radiological	Radiation meter will be used, at a minimum, during initial work activities around the barrier fence area on site. If radiation levels are determined to be two to three times above background levels or above state/federal standards, stop work and immediately notify the Site PM and HSO.
	Exposure to contaminated dusts	Use dust control when > 1 mg/m^3 to minimize the release of dust. Use of PPE and air monitoring.
	Biological flora and fauna (Snakes, stinging insects, fleas, ticks, poison ivy, wildlife)	Workers shall wear long pants/coveralls and steel-toe boot. Avoid biological hazards by staying out of tall grasses and weeds. If a worker experiences a wasp/bee sting, flea or snakebite, the worker shall be immediately taken to seek medical attention. Immediately notify PM and SSHO.
	Weather extremes	Provide for frequent weather broadcasts. Establish site-specific contingencies for severe weather conditions. Discontinue work during severe weather.
	Fires	At a minimum a 10-lb. ABC fire extinguisher will be located on site. All refueling will be conducted either off site at a commercial filling station. Provide for frequent radio broadcasts. If a fire is encountered evacuate site immediately call 911.
	Thermal stressors	Heat stress: wear light clothing. Conduct work during the cooler parts of the day (e.g. morning/evening). Drink plenty of water, take frequent breaks, and have access to shade. Cold stress: wear water proof and layered clothing. Have access to change of clothing, blankets, and warming shelter.
	Sunburn	Apply sunscreen, wear hats/caps and long sleeves.
	Overhead hazards	Wear hardhat.
	Employee injuries from equipment operations	Workers trained on safe work practices and heavy equipment operation. Maintain "3-point" contact when climbing on equipment. Maintain line-of-site contact with operator. Utilize experienced operators. Inspect equipment daily.

6.1 Noise Exposure

Exposure to excessive sound levels can cause temporary or permanent damage to hearing. In addition, noise interferes with communication and a worker's ability to hear audible signals such as warning alarms. OSHA has established a Permissible Exposure limit of 90 decibel A-weighting scale (decibel [dBA]) and an Action Level of 85 dBA, calculated as an eight-hour time-weighted average, to protect workers from noise-induced

hearing loss. Site workers involved in drilling, excavation, or the use of other noisy equipment will be provided with ear plugs or other National Institute for Occupational Safety and Health (NIOSH) approved hearing protection devices.

6.2 Cold Stress

Personnel working outdoors in low temperatures, especially at or below freezing point (32° F) are subject to cold stress. Exposure to extreme cold for even a short time can cause injury to the surface of the body. Areas of the body with high surface area-to-volume ratios (such as fingers, toes, and ears) are the most susceptible to cold-related injury.

Several factors influence the development of cold injury: ambient temperature, wind velocity, and wet conditions from storm events or impoundment water. Wind chill is used to describe the chilling effect of moving air in combination with low temperature.

Hypothermia is a lowering of the body temperature. It is commonly associated with exposure to freezing or rapidly dropping temperature, and is aggravated by immersion in water. The initial symptom is shivering, followed by progressively severe symptoms including apathy, listlessness, sleepiness, (sometimes) rapid cooling of the body to less than 95° F; unconsciousness, glassy stare, slow pulse, and respiratory rate; freezing of the extremities; and finally death.

Injury resulting from cold is included in the generic term frostbite. Symptoms of frostbite begin with whitening of skin; progressing to a waxy or white appearance that is firm to the touch, but tissue beneath is resilient; and to "Deep frostbite" which is characterized by tissues that are cold, pale, and solid. Extremities affected by frostbite should be gradually warmed using body heat. Do not rub the frostbitten part (this may cause gangrene); also do not use ice, snow, gasoline, or anything cold on the frostbitten area. Do not use heat lamps or hot water bottles to re-warm the affected part.

Field activities shall be terminated by the site coordinator or SSHO if initial signs of frostbite or hypothermia exist or if equivalent (windchill) temperature is below 0° F. All affected personnel shall be kept warm with proper clothing (waterproof and layered clothing), blankets, and receive immediate medical care. Give affected person a warm drink — not coffee, tea, or alcohol.

6.3 Heat Stress

Although the site work activities will be conducted during autumn when cooler temperatures are anticipated, the risk of heat stress is greater where the use of PPE is worn. Heat stress occurs when the rate of heat gain is greater than the body's ability to remove it. Heating of the body occurs from three sources: radiant heating from heat sources or sunlight; heating from contact with a warmer object or liquid; and metabolic heating caused by activity. The body's natural cooling mechanisms include respiration (exhaled air is warm and removes heat from the body; as the body overheats, respiration becomes more rapid); radiation (heat is released at the surface of the skin; as the body

overheats, the surface blood vessels dilate and allow more heat to be lost); and evaporation (perspiration is released to the skin surface and evaporates; the skin is cooled by evaporative cooling).

Heat stress may occur with or without the use of PPE, but the risk is greater when PPE is worn. PPE adds layers of clothing that insulate the wearer from cooling air. Chemical protective clothing generally has a vapor barrier to keep out chemical vapors. The vapor barrier also prevents evaporative cooling of perspiration.

In order to prevent heat-related injuries, personnel should become acclimated to heat for several days whenever possible. Other recommendations to avoid heat stress include: plan work in the cooler portions of the day; site preparation activities, instrument calibrations, equipment preparation, and planning should be completed before the field team dresses out; and take frequent breaks and consume at least one pint of cool fluid every hour. Electrolytes may be replenished through the consumption of diluted drinks. Concentrated salt, electrolytes, or juices can increase susceptibility to heat stress and should be avoided. Symptoms of heat stress are listed in Table 8.

Table 8 Heat Stress Symptoms and Treatment

Condition	Common Symptoms	Treatment
Slightly elevated body temperature	Temperature 100 to 101 °F Headache	Drink cool fluids. Rest in cool place until temperature and pulse are below 100 and 110, respectively.
Heat rash	Rash mainly on back	Shower at the end of the shift.
Heat cramps	Muscle cramps or twitching often starting in abdominal area Pain in hands, feet and abdominal areas	Remove from field work. Take off PPE. Encourage consumption of cool fluids designed to replenish electrolytes (e.g., Gatorade).
Heat exhaustion *	Temperature between 99-102 °F Elevated pulse Profuse sweating Pale skin Cool wet/clammy skin Lethargic Nausea Dizziness	Remove from field work. Take off PPE. Drink cool fluids. Rest in cool place. No field work for at least 48 hours.
Heat stroke *	Temperature greater than 102 °F Hot, dry skin Flushed skin Light or no sweating Rapid pulse	**LIFE THREATENING** Remove PPE. Remove from field work. Flush with cool, not cold water. Drive to hospital. Written release from doctor required to return to work.

If in doubt about whether the condition is heat exhaustion or heat stroke, seek medical attention.

6.4 Hot Work

Hot work includes activities that generate sparks or open flames. Examples include welding, cutting, brazing, grinding, and using demo saws. No welding or cutting activities are anticipated to occur for the scope of work for this site. For that reason, no hot work program is implemented for this site.

6.5 Energy Control or Lockout/Tagout Program

This section of the HASP represents the site-specific hazardous energy control program (in compliance with 29 CFR 1910.147), and is included even when the employer is not covered by 1910.147 in order to indicate that a site-specific evaluation for the control of hazardous energy has been made. The purpose of this section is to identify all machine and equipment repair and maintenance activities that require Lockout/Tagout (LOTO) procedures under 1910.147. All equipment or machines brought on site shall be in good working condition with all guarding and other safeguards in place for normal use and work activities. Any equipment found not to be in good working order shall be immediately removed off site and either taken to the contractors repair shop or a qualified equipment repair facility. Absolutely no equipment repairs or maintenance shall be conducted on site.

6.6 Utility Hazards

Underground utilities may present a severe risk to the health of the workers, the public, and the environment during intrusive activities. Before work begins, all utilities must be located (water, gas, sewer, phone, electric, cable, etc.). Contact the Utility Notification Center of Colorado to set up utility locates. Then, before work starts, the foreman must perform a visual inspection of the work area. This inspection should assess the utilities' likely route(s) in relation to the work area.

In the event of an accident involving underground utilities, the following procedures should be followed:

1. STOP WORK.
2. Secure the area, if necessary.
3. Contact the Project Manager.
4. Contact the Utility Notification Center of Colorado at (800) 922-1987.
5. Control the situation under the direction of the Project Manager.

6.7 Biological Hazards

Several biological hazards may be encountered at the site. These hazards include biting insects, fleas, ticks, snakes, other wildlife, and the presence of mouse droppings and nesting material that may carry Hantavirus.

6.7.1 Biting Insects

Site personnel shall be notified of the potential risk of biting insects such as fleas, bees, ticks, nats, flies, and mosquitoes. Ticks have the potential to carry and transmit Lyme Disease and Rocky Mountain Spotted Fever. Mosquitoes have the potential to transmit West Nile Virus. Fleas have the potential to carry bubonic plague. Appropriate measures, such as the use of bug repellent, use of bug resistant clothing (i.e., head nets, and long sleeve shirts), and daily inspection of body parts shall be utilized. Bug repellent

that contains DEET (N, N-diethyl-meta-toluamide) may be used in accordance with the manufacturer's directions and the following precautions:

- For adults, a maximum concentration of 30 percent is recommended.
- When applying, avoid wounds, scratches and the area around the eyes and mouth.
- Avoid over-saturation. It is not necessary for adequate protection.
- Cleanse the skin with soap and water after returning indoors.

Care for insect bites shall include the use of ice and insect bite ointment. In the event of an allergic reaction to DEET containing bug repellent or insect bites, the worker will be taken immediately to seek medical attention.

6.7.2 Snakes and Spiders

The potential exists to encounter snakes while working around open prairie, steep slopes, unstable terrain, and abandoned structures located on site. Steel-toe work boots covering the workers ankle and long pants are required when working at the site. Workers should thoroughly look around the area for snakes and other wildlife when conducting site work and sampling activities. Site workers should also use the buddy system when conducting field activities. If a snake bites a site worker, seek immediate medical attention.

6.7.3 Hantavirus

The site is located in an area, which is a potential habitat for Deer mice. Deer mice are known to be the primary reservoir for Sin Nombre virus, casual agent for Hantavirus Pulmonary Syndrome (HPS). The virus does not cause disease in the infected mice. Deer mice shed the virus in their saliva, urine, and feces. Individuals who come into contact with contaminated material are at risk of contracting HPS through inhalation of aerosolized particles. There are also concerns with direct contact with rodents and the virus spreading through biting.

The potential exists to encounter materials contaminated with mouse droppings and nesting material while working around the site. Site personnel are prohibited from entering the mill area and abandoned sheds on site. If suspect mouse droppings and nesting materials are found, the site HSO shall be immediately notified and work in these areas shall stop until the appropriate level of respiratory protection and PPE is donned.

7 HEALTH AND SAFETY MONITORING PROGRAM

7.1 General

Based on the evaluation summarized in Section 5.3, airborne concentrations of site contaminants will be minimized by control of the total dust concentrations. Site field sampling activities and construction of the barrier fence are not expected to result in significant dust concentrations. However, dusty conditions or if visible dust concentrations arise for any reason (e.g., high winds), air monitoring for dust will be conducted. If dust levels are above 1 milligram per cubic meter (mg/m^3), all work shall stop until levels decrease below the established site action level.

The monitoring may be performed by a WALSH SSHO or a Monitoring Technician (MT) reporting directly to the site SSHO. The monitoring may include the use of direct-reading air monitoring instruments and may also include personal air sampling pumps for quantifying the different types of air contaminants suspected to be present.

7.2 Personal Air Monitoring

Air monitoring will be conducted in the workers breathing zone during the first three days of intrusive fence construction activities in order to evaluate worker exposure to total dust, lead, arsenic, uranium metal and for gross alpha/beta count.

TLD badges will also be worn by all workers conducting intrusive activities including Geoprobe, soil sampling, fence construction and prairie dog trapping activities. A site-specific dose limit of 80 mrem/week has been established for this site. The results of the TLD badges will be kept in the employee's permanent record.

7.3 Instrument Use

The following air monitoring, instruments will be used to monitor the work area and/or the quality of breathing air in the work areas, especially during intrusive work. The locations and frequency of the monitoring will depend on the specific activities and the areas in which the activities occur. A direct reading MiniRam dust monitor will be used during all intrusive fence building activities. In general, air monitoring will be conducted most extensively during Geoprobe and soil sampling activities, during intrusive fence building operations and during prairie dog trapping activities. Table 9 lists the monitoring equipment that may be used on the project and the corresponding calibration frequency and parameters to be measured. Background will be measured daily for the radiation-measuring equipment.

Table 9 Air Monitoring Equipment

Monitoring Instrument	Calibration or Performance Check Frequency	Parameter(s) to be Measured
MiniRam Dust Monitor	Daily before and after use	Dusts and particulates.
Ludlum Model 19A Micro R Meter	Performance check daily before and after use	Ambient radiation exposure in work areas (Gama and X-ray)
Ratemeter with Ludlum Model 44-9 Pancake G-M detector	Performance check daily before and after use	Areas of radioactive material and/or contamination. (alpha, beta, and gamma). Monitoring to be performed of work area; site material that requires close contact; and personnel and reusable equipment, items, and materials that leave the work area and cross the established work zone.
Personal breathing zone or area air sampling pumps	Calibration before use and after use	Initial exposure assessment for airborne dust, lead, arsenic and uranium. Radioactive contamination for gross alpha/beta.

7.4 Action Levels

Table 10 lists action levels for precautionary measures to be used for all activities performed within the scope of this project.

Table 10 Action Levels for Precautionary Measures

Instrument	Readings and Action Levels	Action
MiniRam dust monitor	<1 mg/m3	Continue work.
	> 1 mg/m3	If elevated dust levels above 1 mg/m^3 or DAC levels continue only respirator qualified personnel will be allowed to continue work wearing Level C respiratory protection with particulate/rated radionuclide-protective cartridge. Initiate PBZ monitoring for lead, arsenic.
Ludlum Model 19 micro R meter	> Approx. two to three times background but less than 100 µR/hr	Consider area to have elevated levels of radiation exposure. Conduct work in accordance with dose limit. Wear minimum Modified Level D (gloves and Tyvek) if contact with site materials is possible. Perform contamination monitoring when leaving the area.
	> 100 µR/hr	Stop work. Consult with SSHO before proceeding (due to the low level of radiation training received by site personnel).

Instrument	Readings and Action Levels	Action
Ratemeter with pancake GM detector	> Approx. two to three times background	Work area: Consider intrusive soil activities to be radioactive. Perform contamination avoidance. Wear minimum Modified Level D (gloves and cotton/Tyvek coveralls) if contact with site materials is possible. Perform contamination monitoring when leaving the area. Person, item, material: Consider to be contaminated. Perform contamination monitoring when leaving the area.

DAC = Derived air concentration

If the action levels are exceeded and the required PPE is donned (see Table 10), the SSHO may require additional sampling for site contaminants. Personal breathing zone air sampling will be conducted by an industrial hygienist under the direction of the SSHO. Sampling may be performed for total nuisance dust (particulate) (NIOSH Method 0500); lead and arsenic (NIOSH Method 7300M); and radionuclides (uranium, radium, and/or daughter products).

8 PERSONAL PROTECTION PROGRAM

8.1 Introduction

Levels of personal protection required for the site activities are presented in Table 11. The required PPE for these levels of protection are presented in Table 12. Based on evaluation of potential hazards and the proposed activities, the minimum level of PPE designated for each task is a "Level D" ensemble. However, some tasks may require "Modified Level D" including gloves, cotton/tyvek coveralls and boot covers where there is a potential for contacting contaminated soil.

Personnel working in areas where no direct contact to uranium tailings, soil, sediment, and water will occur may wear Level D. If contaminated soil is to be handled, the Modified Level D will be required. If the soils are not to be handled, the Level D will be maintained unless health and safety monitoring indicates contaminates at the action level listed in Section 7. When levels are exceeded, the required level of personal protection must be donned. Equipment to allow upgrade of PPE to Level C will be available on site or work activities must stop and the immediate area of contamination shall be evacuated.

Table 11 Levels of Protection

Activity	Levels Of Personal Protection	
	Initial	When monitoring indicates conditions exceed action levels
Site inspections/reconnaissance or other work where contamination is not suspected	D	Stop work
Sampling or other work where contamination is suspected and contact is possible	Modified D	Stop work
Trenching, post hole digging and fence installation	Modified D	Stop work
Prairie dog trapping activities	Modified D	Stop work
Flow fill operations	D (with nitrile gloves)	Stop work

Table 12 PPE for Levels of Protection

LEVEL D	MODIFIED D
• Steel-toe construction work boots • Hard hat American National Standards Institute (ANSI-approved) • Safety glasses • Work gloves • Nitrile gloves under work gloves when potential for contacting soil • Fluorescent safety vest when working around heavy equipment	• Steel-toe construction work boots with disposable boot covers • Hard hat (ANSI-approved) • Safety glasses • Nitrile or latex inner gloves under work gloves. Vinyl outer gloves, if necessary • Tyvek or cotton coveralls (poly-coated Tyvek or Saranex for work where there is a potential for contact with contaminated liquid) • Goggles or face shields required for work where there is a potential for splash or spray of contaminated liquid • Fluorescent safety vest when working around heavy equipment

8.2 Respiratory Protection

Exposure through inhalation may be minimized with respirator use if sustained dusts levels (over 5 minutes) of 1 mg/m^3 are detected in the work area using the Miniram dust monitor. Only workers who are respiratory qualified in accordance with the OSHA Respiratory Protection Standard (29 CFR 1910.134) will be allowed to continue working in the area. All other site workers will have to stop work activities and leave the area until dust suppression (water trucks) methods are utilized to control dust levels to below 1 mg/m^3 and/or until air sampling results demonstrate that airborne exposures are below allowed exposure limits. If >25% derived air concentration (DAC) for radionuclide is encountered, all work will stop until the RSO evaluates engineering and PPE controls.

8.3 Personal Protective Equipment for Chemical and Radiological Exposure and Physical Hazards

The following list specifies personal protective equipment for the various areas of the body. The list is meant to serve as a supplement to Table 11.

- **Skin:** To provide skin protection, protective clothing such as cotton or Tyvek coveralls and nitrile gloves must be worn when there is reasonable probability for contact with contaminated soil. Coated or liquid-resistant Tyvek and neoprene gloves shall be used when there is a reasonable probability for contact with contaminated liquids.

- **Head:** Hard-hats must be worn near potential overhead hazards.

- **Eye:** At a minimum, safety glasses will be worn. Safety goggles or face-shields must be worn when splash hazards or flying projectile hazards are present.

- **Ear:** Hearing protection must be worn when the noise level appears to approach 85 dB. As a reference, when conversation becomes difficult at a distance of a few feet, the decibel levels may be greater than 85 dB.

- **Foot:** Steel-toe construction work boots with boot covers will be worn.

9 TRAINING REQUIREMENTS

All personnel working in the contaminated area shall receive training in accordance with the site HASP on the known and potential hazards present in the project area. Training will include review of the site HASP and information from the previous investigations performed in this area to identify potentially hazardous situations. The training may be done prior to the start of work operations or during special sessions.

Each contractor working on site must provide their employees training in respect with their work operations in accordance with OSHA Construction Standard (29 CFR 1926) and relevant General Industry Standards (29 CFR 1910), where applicable.

Site visitors shall not be allowed in the work area unless they have been trained on the requirements of this HASP, sign the appropriate acknowledgment form, and all work stops and results of direct reading air monitoring instruments indicate that airborne contaminants are within background levels and below site action levels. If site visitors remain in the work area during on-going work operations, additional provisions such as wearing the necessary PPE, TLD badge, and other personal air monitoring equipment requirements as specified by the SSHO..

10 EMERGENCY RESPONSE PLAN

10.1 GUIDELINES FOR PRE-EMERGENCY PLANNING AND TRAINING

Site personnel must read this HASP and familiarize themselves with the information it contains. Site personnel will also be required to have a copy of this plan and a list of the emergency contacts and phone numbers immediately accessible on site and to know the route to the nearest qualified emergency medical services.

In the event that there is a fire, contaminant exposure, or medical emergency requiring evacuation, site personnel will immediately initiate emergency response protocol. The affected individual(s) must receive the appropriate medical attention to evaluate the degree of injury. If necessary, site personnel may transport the injured person to the emergency room. If life threatening or if movement could worsen the injury, call for an ambulance. A First Aid kit shall be available on site during work activities.

10.2 EMERGENCY RECOGNITION

Emergency conditions are considered to exist if:

- Any worker is involved in an accident or experiences any adverse health effects or symptoms of exposure while on site, or a condition is discovered that suggests the existence of a situation more hazardous than anticipated.
- In the event that any site personnel experiences adverse health effects or symptoms of exposure while on site, the entire crew working in that area will immediately halt work. Contact the site HSO for further instructions.
- The affected individual(s) must receive the appropriate medical attention to evaluate the degree of injury. If necessary, site personnel may transport the injured person to the emergency room. If life threatening or if movement could worsen the injury, call for an ambulance.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated will result in the evacuation of the work crew and re-evaluation of the hazard and the level of protection by the HSO.

10.3 Emergency Contacts

In the event of any unplanned situation requiring assistance, the appropriate contact(s) shall be made from the list below. For emergency situations, telephone or radio contact should be made with the project manager or SSHO who then may contact the appropriate response teams. If possible, contact the medical facility while in route.

Emergency Contacts	Phone Number
Fire Department	911
Police	911
Ambulance	911

EPA National Response Center for spill reporting	(800) 424-8802
CDPHE General information	(303) 692-2000
Emergency Health Problems:	**Call 911**
Non-emergency Health Problems	**Phone Number**
Boulder Community Hospital (Figure 2) 4745 Arapahoe Avenue Boulder, CO 80303	(720) 854-7854

Directions to Hospital:
From the Site, travel south for 1 mile on 63rd Street to Arapahoe Avenue. Turn right and travel west for 1.5 miles to Boulder Community Hospital located on the north side of Arapahoe Ave.

Employer Contacts

City of Boulder Project Manager	Bill Boyes	(303)884-4125 (303) 884-4128 mobile
Walsh Corporate Health and Safety Manager	Lindsay Breyer, CIH	(303) 443-3282 (303) 517-0735 mobile
Walsh Project Manager Site Safety and Health Officer	Ronald Crandall, CHMM	(303) 443-3282 (303) 886-6102 mobile
Walsh Site Monitoring Technicians	Jason Martin Rick Mruz	303) 443-3282 (303) 886-8439 mobile (303) 408-7758 mobile
Walsh Field Scientist	Barbara Robinson	(303) 443-3282 303 570-5184 mobile
Champion Fence Project Manager	Chad Warwick	(303) 467-1910 (303) 210-5087 mobile

10.4 Personnel Roles, Lines of Authority, and Communication

In the event of an emergency at any work site, the site superintendent, project manager(s), or SSHO will assume authority and be responsible for site decision making. These individuals have the authority to resolve all disputes about health and safety requirements and precautions. The site project manager(s) or SSHO will also be responsible for coordinating all activities until emergency response teams (ambulance, fire department, etc.) arrive at the site.

In the event of a fire or other emergency, the site superintendent, project manager(s), or HSO will ensure that the necessary personnel are contacted as soon as possible after the emergency occurs. All on site personnel must know the location of the nearest phone and the location of the emergency phone number list.

11 SITE CONTROL AND SPILL RESPONSE PROGRAM

The following site control and spill response program shall be followed in order to minimize potential contamination of workers and the environment, to protect the public from potential site hazards, and to prevent unauthorized access to the site.

11.1 Site Control Measures

If elevated levels of site contaminants are identified, the work area (exclusion zone) shall be clearly defined by the site coordinator using fencing, traffic cones, or security tape to prevent unauthorized or unprotected persons from entering the area. The site coordinator will also designate an area outside of the exclusion zone for the organization and planning of on-site activities. The establishment of work zones ensures that personnel are properly protected from the potential hazards in the area where they are working, that work activities and potential contaminants are limited to specific areas, and that personnel can be easily located and evacuated in an emergency.

There are a number of ways by which the possibility of exposure or translocation of contaminants can be eliminated or reduced.

- Setting up temporary fencing, physical barriers, and signs to exclude unnecessary personnel from the area.
- Minimizing the number of personnel and equipment onsite consistent with effective operations.
- Establishing control points to regulate access to work zones.
- Conducting operations in a manner that reduces the exposure of personnel and equipment and eliminates the potential for airborne dispersion.
- Implementing appropriate decontamination procedures.
- Inspecting zones to ensure all proper procedures are being followed.
- Maintaining all appropriate records.
- Ensuring that the buddy system is used.
- Ensuring that personal hygiene is followed.
- Establishing safe work procedures for all areas.

11.2 Spill Response Program

A spill response program in accordance with OSHA regulation 29 CFR 1910.120 minimizes the possibility of exposure to workers and to the general public from any contaminants present, and their transport elsewhere (off site). Site contractors shall maintain a spill response kit, shall be available and used onsite in areas where spills, leaks, and ruptures may occur. Where major spills may occur, site personnel shall have an adequate number of sorbents (e.g., absorbent pads, socks, booms, buoys, dri-Zorb) and spill response and containment equipment onsite to contain and isolate the entire volume of the hazardous substance. Fire extinguishing equipment shall be present to handle small fires.

12 SCREENING AND DECONTAMINATION PROCEDURES FOR CHEMICAL AND RADIOLOGICAL CONTAMINANTS

The sampling and barrier fence construction work will occur in an area adjacent to contaminated uranium tailings. The immediate area where the intrusive activities will occur may be considered a contaminated area and the equipment that contacts contaminated material may also be considered contaminated.

All heavy equipment including Geoprobe drilling equipment and trenching and post hole digging equipment will be monitored for radiation with the pancake GM detector prior to coming on the site. Heavy equipment will again be screened for radiation with the pancake GM detector prior to leaving the work area. If the radiation levels exceed approximately two to three times background, the equipment will be decontaminated beginning with simple, non-invasive methods (e.g., adhesive tape removal, dry brushing, etc.) and advancing to more rigorous methods as needed (e.g., steam cleaning, soap and water, etc.). Surfaces will be re-monitored when dry to ensure that decontamination was successful.

All personnel and equipment not considered to be in the contamination area will not require much cleaning effort. The disposable PPE may be disposed in a general sanitation receptacle and the reusable PPE should be cleaned per the manufacturer's recommendations. Equipment should be cleaned of gross amounts of soil by brush or scraper before leaving the site. In addition, a hand-washing station shall be available for use before lunch and at the end of each workday prior to workers leaving the site.

When an area is considered a contamination area (e.g., an area of intrusive activity where site contaminant action levels have been exceeded), an on-site decontamination area and staging area will be established outside and upwind of the contaminated area. Entry and exit to the contaminated area will be controlled. No unauthorized personnel shall proceed into the contamination areas.

All personnel and equipment leaving the vicinity of the primary and secondary tailings pond will be monitored for radiation with a pancake GM detector before leaving the work area. If radiation levels exceed approximately two to three times background, decontamination will be instituted beginning with simple non-invasive methods (e.g., adhesive tape removal, dry brushing, etc.) and advancing to more rigorous methods, as needed (e.g., soap and water, chelating agents), under the supervision of a radiation protection professional. Persons will be re-monitored when dry to ensure that decontamination was successful.

Personnel using disposable PPE:

1. Remove outer boots and gloves.
2. Remove protective coveralls, and inner gloves.

3. Monitor personnel for radiation with pancake GM detector. If readings exceed approximately two to three times background, perform decontamination as per above until radiation levels are below two to three times background.
4. Wash all exposed skin (face and hands).
5. Bag all disposable PPE.

Equipment

1. Use brushes, shovels or other methods to remove any loose soil.
2. Monitor equipment for radiation with pancake GM detector. If readings exceed approximately two to three times background, perform decontamination as per above until radiation levels are below two to three times background.
3. Control all decontamination water.

Waste material including PPE and decontamination material will be placed into sealed containers and screened for radiation using a pancake GM Detector. If, radiation levels exceed approximately two to three times background, this material will be placed into secured drums, labeled, and stored in a secure location on site for later disposal in compliance with applicable regulations.

13 RECORD OF HASP REVIEW

The undersigned have reviewed the contents of this HASP for the work activities required as part of the Valmont Butte Barrier fence construction and prairie dog relocation project in Boulder County, Colorado (WALSH 7960-010). They understand the means and objectives of the work plan and have been fully apprised of the risks and hazards involved in accomplishing the work. They further agree to comply with the requirements and protocols set forth in this document.

NAME	SIGNATURE	DATE

HSO or designee

14 REFERENCES

OSHA, 29 CFR 1910. Occupational Safety and Health Administration General Industry Standards.

OSHA, 29 CFR 1926. Occupational Safety and Health Administration Construction Standards.

Roe Ecological Services. May 2006. Results from tissue samples and request for concurrence or further input Valmont Butte Site, Boulder, CO.

URS. January 2005. Analytical Result Report for Site Reassessment under the USEPA Superfund Technical Assessment and Response Team 2 (START2) Region VIII.

FIGURES

FIGURE 1 SITE MAP

FIGURE 2 MAP TO HOSPITAL

Figure 1 Site Map

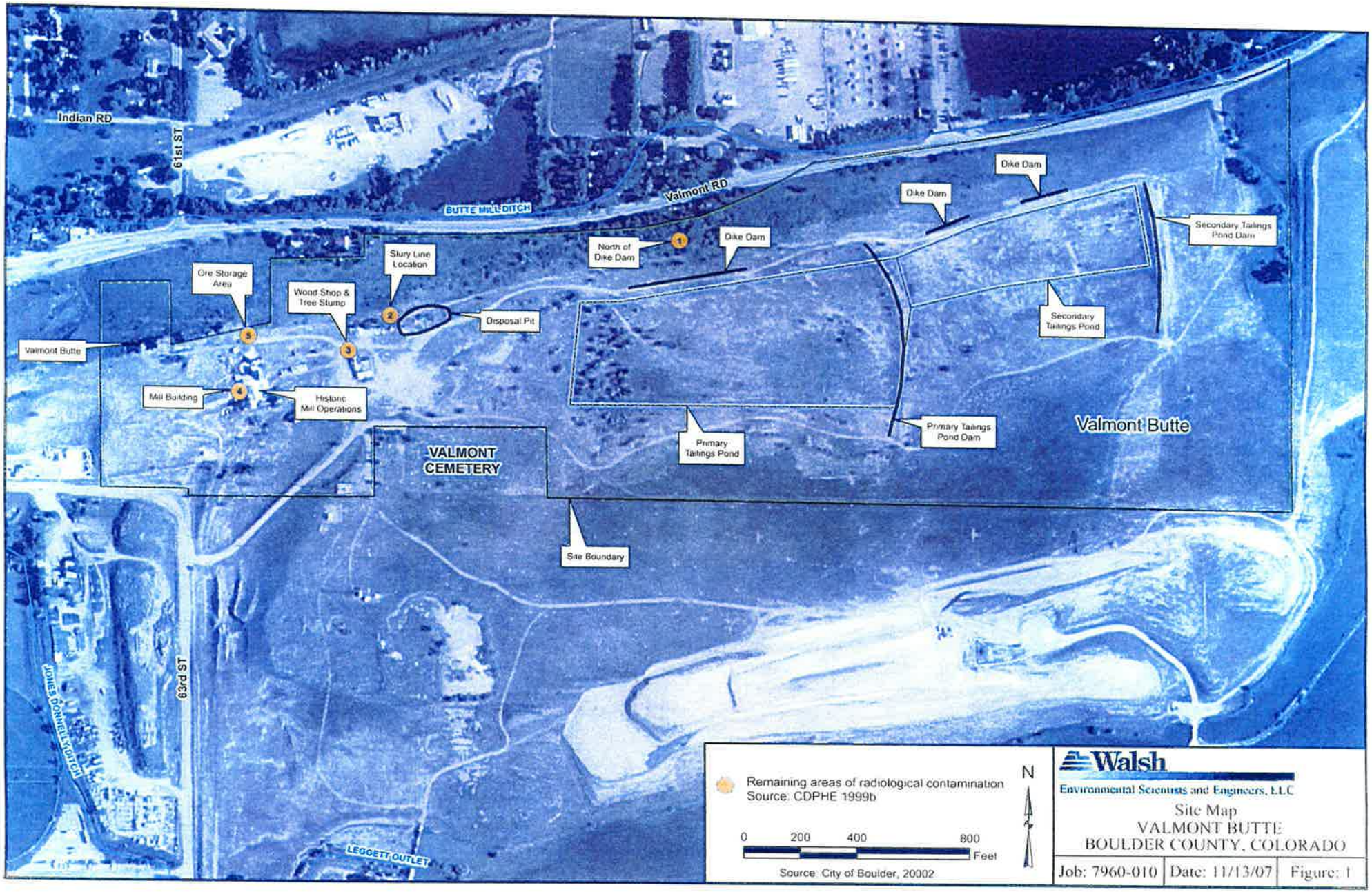
Indian RD
61st ST
BUTTE MILL DITCH
Valmont RD
Dike Dam
Dike Dam
Dike Dam
Secondary Tailings Pond Dam
North of Dike Dam
1
Slury Line Location
2
Ore Storage Area
5
Wood Shop & Tree Stump
3
Disposal Pit
Valmont Butte
Secondary Tailings Pond
Mill Building
4
Historic Mill Operations
Primary Tailings Pond
Primary Tailings Pond Dam
Valmont Butte
VALMONT CEMETERY
Site Boundary
63rd ST
JONES DONNELL DITCH
LEGGETT OUTLET
Remaining areas of radiological contamination
Source: CDPHE 1999b
0
200
400
800
Feet
Source: City of Boulder, 20002
N
Walsh
Environmental Scientists and Engineers, LLC
Site Map
VALMONT BUTTE
BOULDER COUNTY, COLORADO
Job: 7960-010
Date: 11/13/07
Figure: 1

Figure 2 Map to Hospital

Figure 2 Map to Hospital

Start out going Southeast on 63rd St./CR 39 toward Stazio Dr.	1 mile
Turn Right onto Arapahoe Rd/CO-7. Continue on Arapahoe Rd/CO-7	1.5 miles

End at Boulder Community Hospital
4745 Arapahoe Ave., Boulder, Co 80303
(720) 854-7854

Total Est. Time: 5 Minutes Total est. Distance 2.58 Miles